**Thesis Ref. No._____**

**ADDIS ABABA UNIVERSITY COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE DEPARTEMENT OF CLINICAL STUDIES**

# COMPILED SURGICAL CASE REPORTS: PROCEDURES, TECHNIQUES AND TREATMENT OUTCOMES IN DIFFERENT SPECIES OF DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, ADA'A DISTRICT, EAST SHOWA ZONE, OROMIA, ETHIOPIA

**MVSc THESIS**

**BY**

**SOLOMON AMENTE ADUGNA**

**JUNE 2022**

**BISHOFTU, ETHIOPIA**

**ADDIS ABABA UNIVERSITY COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE DEPARTEMENT OF CLINICAL STUDIES**

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**A Thesis Submitted to the College of Veterinary Medicine and Agriculture of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Veterinary Science in Veterinary Surgery**

**BY**

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**JUNE 2022**
**BISHOFTU, ETHIOPIA**

**APPROVAL SHEET**

**Addis Ababa University**

**College of Veterinary Medicine and Agriculture**

**Department of Clinical Studies**

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As MVSc research advisor, We hereby certify that We have read and evaluated this Thesis prepared under our guidance by Solomon Amente entitled **"COMPILED SURGICAL CASE REPORTS: PROCEDURES, TECHNIQUES AND TREATMENT OUTCOMES IN DIFFERENT SPECIES OF DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, ADA'A DISTRICT, EAST SHOWA ZONE, OROMIA, ETHIOPIA".**

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**STATEMENT OF THE AUTHOR**

I, the under signed, declare that this thesis entitled "**compiled surgical case reports: procedures, techniques and treatment outcomes in different species of domestic animals in and around Bishoftu town**", submitted in partial fulfillment of the requirements for an advanced Master of Veterinary Science degree at Addis Ababa University, College of Veterinary Medicine and Agriculture is my original work and that all sources of material used for this thesis have been duly acknowledged. This thesis will be deposited at the University/College library to be made available to borrowers under rules of the Library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the dean of the college when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

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**ACKNOWLEDGEMENTS**

First and foremost, I praise for the Lord God, the source of wisdom and love, who hold me safe throughout the challenges of my life.

I would like to express my sincere and heartfelt gratitude to my advisor **Dr. Jiregna Dugassa** for his unreserved technical and professional advice, rectification of the research work, and meticulous correction of the paper.

I would like to thank Addis Ababa University, School of Post Graduate Sudies for the overall coordination and financial support of this study. It is also my pleasure to acknowledge Dr. Cheru Telila, Dr. Mehari Teklu, Dr. Amenu, Dr. Taye, Mr. Dereje Gudeta, Mr. Getahun Tesfaye, Mr. Tajudin, Ms. Martha and all other VTH staff for their kind support during case management.I am also grateful to acknowledge Dr. Yobsan Degefa and Dr. Sultan Aliyi who took part by giving information and assisting during surgical procedures. I am indebted to acknowledge and appreciate my friend Mr. Neway Girma for his ideal and material support during the study period.

Finally, it is my pleasure to thank my lovely families for their love and encouragement in the whole of my life.

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**LIST OF ABBREVIATIONS**

| | |
|---|---|
| BLV | Bovine Leukosis Virus |
| CRT | Capillary Refill Time |
| VP | Vaginal Prolapse |
| EBL | Enzootic Bovine Leukosis |
| FNA | Fine Needle Aspiration |
| OVH | Ovariohysterectomy |
| PGA | Polyglycolic Acid |
| SBL | Sporadic Bovine Leukosis |
| SPANA | Society for Protection of Animals Abroad |
| VFAs | Volatile Fatty Acids |
| VTH | Veterinary Teaching Hospital |

**ABSTRACT**

The livestock sector plays a pivotal role in the economies of Ethiopia in terms of food and income sources, providing draught power and organic fertilizer for crop production, and as a means of transport. However, the sector is underutilized due to different factors, which can limit the production and productivity,and may cause death of animals. Amongst these, surgical disorders are one of the major causes of morbidity and mortality in animals, but most of the problems can be restored through surgical management. For effective surgical management, adequate practical exposure and empirical observation of surgical clinical cases are decisive. A few surgical cases on large animals have been compiled and published, but surgical procedures and techniques are not well documented on small animals and equines. Hence, this case study was carried out from October 2021 to May 2022 in and around Bishoftu town with the objectives of acquiring all-rounded skills in handling surgical patients, compiling and reporting the surgical case management techniques and postoperative outcomes on different species of domestic animals. Case history, clinical examination and findings, surgical procedures and techniques, postoperative care, and the outcome were documented in detail for each surgical patient. During the study period, a total of 29 animals which comprises 48.27% (14/29) bovines, 24.13% (7/29) canines, 10.34% (3/29) ovines, 6.89% (2/29) felines, 6.89% (2/29) equines, and 3.44% (1/29) camel have undergone different forms of surgical management. Surgical sterilization of male and female animals 17.24% (5/29), cesarean section 13.8% (4/29), and penile amputation 10.3% (3/29) were the most commonly performed surgical operations. Of the total 29 surgical patients, 93.1% (27/29) were recovered successfully, whereas 6.9% (2/29) of animals have died. About 33.33% (9/27) of the recovered animals were recorded with different forms of postoperative complications. In general, to conduct successful surgical management efficient surgical skills and experience, sufficient surgical and diagnostic equipments, and adequate ambulatory services and intensive care units are required.

**Keywords:** *bishoftu, case report, domestic animals, surgery*

## 1. INTRODUCTION

The livestock sector plays a vital role in the economies of many developing countries like Ethiopia. It provides draught power, transport, food, income, employment, and possibly foreign exchange (Bingsheng, 2002). Ethiopia has a huge potential of livestock population with 54 million cattle, 25.5 million sheep, and 24.06 million goats (Benti and Zewdie, 2014). However, the off-take rate and per capita consumption of livestock products are one of the lowest in the world (Andualem, 2016). Technical, institutional, infrastructural, environmental, and policy challenges are key constraints for livestock development (Solomon and Dagim, 2019). Besides, the high prevalence of animal diseases andthe limited national animal health services covering only 40-45% of the country's populationare attributable to lack of personnel, shortage of drugs and equipment, poor mobility, and highland-oriented animal health service delivery (Desta, 2015).

An increased awareness of the importance of the treatment of an individual animal in both rural and urban communities contribute for an increase in demand of better veterinary services in Ethiopia. Anever increasing trend of keeping pure or crossbreed animals and companion pets in urban areas also contributed to the increased demand for the veterinary care of individual animals (Tiruneh *et al*., 2007). Certain animal health problems and disorderscouldn't be treated by medication, necessitates the introduction of veterinary surgery into the veterinary services. Surgical disorders are the major causes of fatality in animals, cause a great loss from decreased production and death of the animals, and affects the country's economy (Sarker *et al*., 2014).

Except for pet animals, surgical operations were performed largely for economic reasons, to quickly restore animals to function (Woods, 2018). In animals with surgical disorders, failure of surgical intervention will lead to the culling or eventual loss of a productive or valuable animal through death (Arju *et al*., 2014). Surgery is an active skill and equipment-based specialty that uses sutures, incisions, excision, or other invasive procedures, as well as, local, regional, or general anesthesia for patient management. It largely demands space, equipment, and personnel expertise(Jamison, 2018).Surgery is an essential part of veterinary care,however, it has risksrelated to anesthesia and surgical complications during or after the operation (Eyarefe and Dei, 2014).

The evidence-based medicine, the wise use of current best evidence in making decisions about the care of individual patients is a well-established concept in human medicine, but it is relatively new and undeveloped in the field of veterinary medicine (Grindlay, Brennan and Dean, 2012). Adequate practical exposure and empirical observation of surgical clinical cases are decisive for effective surgical management and corrections. A few surgical cases on domestic animals have been compiled and published, but surgical procedures and techniques are not well documented.

Therefore, the objectives of this study were:

- To acquire all-rounded surgical skills and experiences in different species of domestic animals
- To document and compile the surgical procedures, techniques, post-operative management, and outcomes in both large and small animals

## 2. MATERIALS AND METHODS

### 2.1. Study Area

The study was conducted from October 2021 to May 2022 G.C at Addis Ababa University College of Veterinary Medicine and Agriculture Feseha G/Ab Veterinary Teaching Hospital (VTH), Society for Protection of Animals Abroad (SPANA), Donkey Sanctuary Clinic, and on-farm in and around Bishoftu town. Bishoftu town is located in Oromia Regional State at a distance of 48 kilometers southeast of the capital Addis Ababa, Ethiopia. Geographically it is stretched between 9$^{o}$N latitude and 40$^{o}$E longitude (Figure 1) and at an altitude of 1920 meters above sea level in the central highlands of Ethiopia. The average maximum and minimum temperature of the area are 34.7 °C and 8.5 °C respectively, and the average relative humidity is 61.3%. The rainfall is bimodal, receives an annual rainfall of 1151.6 mm of which 84% is received during the long rainy season covering June to September and the remaining in the short rainy season extending from March to May (NMSA, 2005).

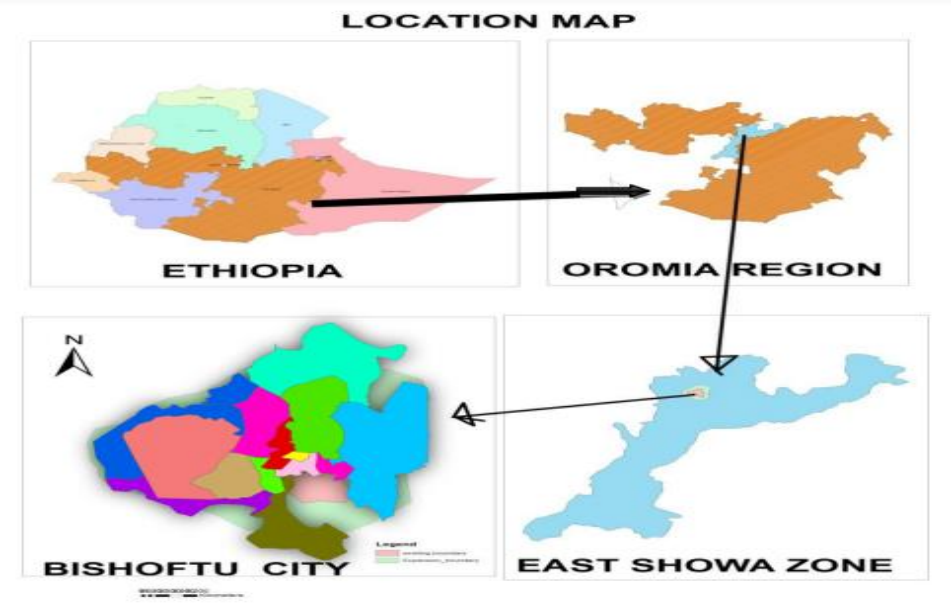



**Figure 1:** Geographical location of the study area

(**Source:** Adapted from Ethiopia mapping Authority and SP of the city, 2015)

## 2.2. Study Animals

The study was conducted on domestic animals of different species,breeds,ages, management systemsand both sexs with various surgical ailments from in and around Bishoftu town. Local breed cattles, donkeys, camels, and sheep were managed extensively, whereas exotic and cross breed cattles were managed by the intensive management system. Horses were managed semi-intensively because they were used for draught purposes. Dog and cats were kept in the house as companion animals. The study includes case reports of 29 animals of different species as summarized in Table 1 below.

**Table 1:** Study animals and the corresponding study site

| **Animal Species** | **Number** | **Study site** | | | |
|---|---|---|---|---|---|
| | | **VTH** | **SPANA** | **Donkey sanctuary** | **On-farm** |
| **Bovine** | 14 | 9 | | | 5 |
| **Ovine** | 3 | 3 | | | |
| **Canine** | 7 | 6 | | | 1 |
| **Feline** | 2 | 2 | | | |
| **Equine** | 2 | | 1 | 1 | |
| **Camel** | 1 | 1 | | | |
| **Total** | 29 | 21 | 1 | 1 | 6 |

## 2.3. Study Design

A descriptive clinical case report was conducted to document and compile surgical cases in different species of domestic animals with detailed information on an individual animal patient. Introduction, patient history, clinical examination, pre-operative management, anesthetic protocol, surgical procedures and techniques, post-operative care, and outcome of the surgical treatments were included in each case report.

## 2.4. Study Method

Domestic animals of different species, breeds, ages, management systems, and both sexes were admitted to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha G/Ab VTH, SPANA, and Donkey Sanctuary clinic with various surgical ailments. Some surgical cases were handled on-farms in and around the town of Bishoftu. An individual case recording sheet was used to record the detailed information of the patient (Annex 2). The diagnosis was made on the basis of history, clinical examination, and sometimes using diagnostic aids. Written consent was signed by the owners before surgery commenced (Annex 3). Then specific surgical operation was performed aseptically after appropriate control of the animal. Samples were taken to the laboratory and processed for confirmation when necessary. Postoperative management was performed on each patient and complications were recorded. Finally, the outcome of the surgical operations was recorded during the follow-up period through follow-up appointments, on phone call, and a home visit. The surgical case reports were compiled according to the organ or organ systems of the animal affected and surgically corrected.

### *2.4.1. Case history*

The owner's complaints related to the case like management system, history of previous disorders and treatment, duration and progress of the illness, recurrence, clinical signs observed by the owners, and other relevant informations were recorded.

### *2.4.2. Patient signalment*

The origin, species, breed, sex, age, color, and name (if any) of the patients were recorded upon admission to the clinic to easily distinguish the animal during follow- up and for legal cases.

### *2.4.3. Clinical examinations*

The case was subjected to a detailed general and systemic clinical examination by visualization of the visible signs, palpation of the affected body part, and using diagnostic tools like a thermometer, stethoscope, and ultrasound. Vital physiological parameters like heart rate (beats/min), respiratory rate (breaths/min), rectal temperature (°C), and capillary refill time (CRT) were measured, recorded, and compared with the normal ranges listed in Annex 1. In addition, the

body weight of the animal, hydration status, visible mucus membrane color, condition of superficial lymph node, and ruminal motility (ruminants) was also recorded according to the format under Annex 2.

### *2.4.4. Laboratory examinations*

Samples like an abscess, calculi, and tumor tissue were taken to the Addis Ababa University College of Veterinary Medicine and Agriculture Multipurpose and Clinical Pathology Laboratories for definitive diagnosis. Then a bacteriological examination of the abscess sample (Gram staining), microscopic examination of the mineral composition of calculi, and cytological examination of the tumor tissue (Giemsa staining) were performed.

## 3. COMPILED SURGICAL CASE REPORTS IN DIFFERENT SPECIES OF DOMESTIC ANIMALS

### 3.1. Surgery of the Urogenital Organs

#### *3.1.1. Open castration in dog*


**Abstract**

Surgical sterilization of small animals is one of the most commonly performed procedures in veterinary practice. This case report is aimed to describe the open castration conducted on two dogs that were presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha G/Ab VTH for surgical sterilization. After aseptically preparing the surgical area skin incision of about 2-3 cm was made into the pre-scrotal midline. Then both testicles were exteriorized through the same incision and tunica vaginalis was opened. Three forceps were placed on the spermatic cord and the spermatic cord was ligated with two separate circumferential ligatures using absorbable suture material PGA #2. Then, the cord was transected between the middle forceps and the one closest to the testicle, and some parts of the spermatic cord along with the testicles were removed. The stump of the cord was replaced within the scrotum and the surgical opening was closed in two layers of subcutaneous tissue and skin using absorbable suture material PGA #1. Antibiotics and anti-pain were administered for three postoperative days. Finally, the dogs were completely recovered after two weeks of the regular follow-up period.



**Key words:** *dog, general anesthesia, open castration, pre-scrotal incision*


**Introduction**

Surgical sterilization of dogs and cats is one of the most commonly performed procedures in veterinary practice to manage the dog population, and consequently prevent the diseases associated with the reproductive system (Olson and Johnston, 1993). Several surgical methods of canine castration have been described including testicle-sparing methods (vasectomy) both for clinical and experimental cases (McCreery, 1976; Baba *et al*., 2013), but do not provide the individual health benefits of orchidectomy. Orchidectomy can be performed by using a pre-scrotal incision or scrotal ablation with either an open or closed technique (Reichler, 2009).

In the pre-scrotal approach, the testis is cranially displaced and exposed through a midline pre-scrotal skin incision, more commonly used in larger dogs (Snell *et al*., 2015). The scrotal approach is commonly used for castrating small dogs and cats but has also been used to safely castrate dogs of any age (Howe, 2006). The pre-scrotal approach offers many advantages in that it improves cosmesis and decreases anesthetic and surgical times, incision length and subsequent surgical trauma, postoperative discomfort, self-trauma, and scrotal hematoma formation (Reichler, 2009). The primary purpose of castration is to prevent reproduction, but the procedure may have both beneficial and undesirable effects (Spain, Scarlett and Houpt, 2004).

In contrast to the ovariohysterectomy, overt hemorrhage following orchiectomy is most often related to bleeding from the tunic, causing incisional hemorrhage, subcutaneous bruising, and scrotal hematoma (Adin, 2011). Serious hemorrhage will lead to signs, such as pale mucous membranes, tachycardia, and slow recovery from anesthesia (Hamilton *et al*., 2014). However, closed orchidectomy more commonly results in increased severity of swelling and bruising of the scrotum and poor cosmetic outcomes after orchidectomy (McKenzie, 2010). The present case report is aimed to describe the open castration conducted on two dogs under general anesthesia.

***Case history and clinical examination*:** Three years old local breed and seven years old exotic breed dogs were brought to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH for surgical sterilization in order to improve their aggressive behavior and prevent mating with another female in the kennel (case2).

Before undergoing the surgical procedure the dogs were examined for any anatomical or physiological disorders. They were found apparently healthy and all the vital parameters are found within the physiological limits. Depending on the history and thorough physical examination both dogs were admitted for castration under general anesthesia.

***Pre-operative preparation*:** The owners were told to withhold feed and water from dogs overnight before admission to the surgery. After chemical and physical restraining of the dogs, the skin of the caudal prepuce, the base of the scrotum, and the adjacent caudoventral abdomen were prepared aseptically by clipping, shaving, and washing with water and diluted chlorhexidine solution (savlon) (Figure 2A). Following the scrubbing of the site with diluted iodine solution, the abdomen was covered with a fenestrated sterile drape by exposing only the surgical area (Figure 3A).

***Anesthesia and animal control*:** Both dogs were sedated with ketamine (Ketamine Hydrochloride injection USP, Germany) @ 10mg/kg, IM. After a few minutes, anesthesia was induced with a combination of diazepam @ 0.5mg/kg (Intas pharmaceutical Ltd., India) and ketamine @ 5mg/kg, IV. Then the dogs were placed in dorsal recumbency and the limbs secured on the surgical table. Following induction, a half dose of anesthetic agent used for induction was used for maintenance to effect throughout the procedure.

***Surgical procedure and technique*:** In both cases, about 2-3 cm long incision was made between the caudal limit of the os penis and the cranial base of the scrotum into the skin and subcutaneous tissues (Figures 2B and 3B). Using both hands, the cranial pole of the testicle was pushed to the incision line by squeezing below the testicle while increasing the incision to exteriorize the testicle. Then, the testicle that displaced through the incision was grabbed and pulled with the right hand using a gauze sponge while the left hand was used to hold at the scrotum to stabilize and break the scrotal ligament which attaches the scrotum to the caudal pole of the testicle (Figure 2C). An incision is made into the parietal tunic to allow direct ligation of the spermatic cord (Figure 2D). Then, the pampiniform plexus and other structures of the cord were clamped with three hemostatic forceps (Figures 2F and 3C) and two separate circumferential ligatures were placed using PGA #1 (Figure 2E). One circumferential ligature was placed beneath the middle forceps and another ligature was placed beneath the most distal forceps. The spermatic cord was transected between the middle forceps and the one closest to the testicle and the testicle was removed. Once the stump of the cord was checked for bleeding by removing the forceps it was replaced within the scrotum. The opposite testicle is brought to the incision and removed in the same manner. Once both testicles were removed and hemostasis is confirmed, the incision was closed in two layers (Figure 3D). The subcutaneous tissue was sutured with a simple continuous suture pattern using the absorbable suture material PGA #2-0. Then skin incision was closed with a subcuticular suture pattern, using PGA #2-0 (Figure 2F). Finally, both dogs were monitored for anesthetic and other complications before being admitted to the home. Prolonged recovery from anesthesia was observed (Case 2) as shown in Figure 3E.


**Figure 2:** Open castration through pre-scrotal incision in local breed dog

**Case 1**

A) Patient control and preparation of surgical area B) Pre-scrotal incision

C) Exteriorization of the testicle D) Incision into the parietal tunic

E) Application of ligature on the cord F) Skin closure


**Figure 3:** Progression of open castration in exotic breed dog

**Case 2**

A) Aseptic preparation of the surgical site B) A pre-scrotal incision
C) Application hemostatic forceps on the cord D) Removal of both testicles and skin closure
E) Patient under anaesthesia post-operatively

***Post-operative care and outcome*:** In both dogs, an antibiotic Penstrep, @1ml/10kg, IM, SID was administered for three consecutive days. Besides, both dogs were administered tramadol, @ 2 mg/kg, IM, SID for three consecutive days. Owners were also advised to restrict exercise for a few days, and apply Elizabethan collars. Upon regular follow-up, certain post-operative complications like swelling in the scrotal area, surgical site irritation, and inflammation were observed (Case 1). However, surgical incisions were healed completely and the dogs had complete recovery after two weeks.

## Discussion

Sometimes, companion animals are quite often a source of displeasure to their owners (Knol, 1987) due to their behavior, mainly aggression, and admitted for euthanization (Stead, 1982). Surgical sterilization of dogs and cats is used as a method of contraception besides reproductive disease management (Olson and Johnston, 1993). Similarly in the present case management surgical sterilization was conducted on dog to prevent breeding and to improve their behavior. Castration may be performed by either an open or semi-closed technique, in which the testis is displaced cranially and exposed using a midline post-scrotal skin incision (Howe, 2006). Open orchiectomy is preferable in larger dogs (>20 kg) as ligatures may be placed directly around the vascular pedicle resulting in more secure ligations (Adin, 2011). The open technique was applied in the current case to prevent the risk of suture slippage.

Open orchidectomy involves incising the parietal vaginal tunic covering the spermatic cord to allow the direct placement of the ligatures. Whereas, closed orchidectomy involves ligation of the intact spermatic cord and vaginal tunics (Hamilton *et al*., 2014). Before incising the surgical site, the surgical area should have to be aseptically prepared by clipping the long hair, shaving the area around, including the scrotum, washing the area with water and soap, scrubbing with an appropriate antiseptic solution, and draping with sterile cloth (Kustritz *et al*., 2017). This was similar to the current case preoperative preparation of the surgical site. Once the scrotum was aseptically prepared, one of the testicles was gently grasped and directed caudoventrally away from the body to pull the scrotal skin taut over the testicle. Then the testicles were exteriorized through the pre-scrotal incision. Similar technique was described in the reports of the author (Reichler, 2009).

In an open castration technique, the tunic, the tough membranous covering of the testicle, associated structures, is incised and each structure is ligated separately (Howe, 2006). This technique was used in the current surgical case management, because during closed castration of dogs there is always some danger that the vessels may slip out of a knot. By ligation of the vascular pedicle and avascular parts of the cord, the vascular pedicle was replaced within the tunic and then into the scrotum once hemostasis was confirmed. This surgical technique was similarly used by the authors (Adin and Scansen, 2011). Generally, castration is an effective and recommended way of improving the undesirable behaviour of dogs ruther than euthanization.

*3.1.2. Open castration in dromedary camel*

**Abstract**

Most of the time, castration is an elective procedure performed to make the camel docile and manage its behavior. There are also instances, where it is performed as a treatment of testicular abnormalities such as orchitis, irreparable traumatic injuries, and tumors. In the current study, a seven years old bull dromedary camel was brought to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of recurrent swelling of the left testicle since a month. Based on history and clinical examination the case was diagnosed as unilateral orchitis and admitted for open castration of both testes. 2% lidocaine hydrochloride was injected into each testicle to provide a spermatic nerve block and then two parallel incisions were made through the scrotal skin on either side of the median raphae. The testicles were pulled out through these incisions, ligated, and transected. The scrotal incisions were left open to heal by second intention. Post-operatively antibiotic and anti-inflammatory drugs were administered for three successive days. Finally, the camel was regularly followed for one week and recovers uneventfully.

**Keywords:** *bull dromedary camel, castration, orchitis, scrotal incision*

**Introduction**

Most of the time, castration is an elective procedure performed to render the camel docile and manage its behavior because it can make them more manageable and easier to work with (Telfah, Siddiqui and Taleb, 2012). Castrated animals sometimes make a better captive display animal as they do not come into a rut and will not become aggressive towards keepers or the public. Sometimes, castration is also performed to avoid accidental mating from the inferior sire and in rare conditions such as testicular abnormalities including orchitis, irreparable traumatic injuries, and tumors (Chittora et al., 2020). The ideal age to castrate a male camel is between 4-6 years old (Moretti, 2008). Castration is done in camels in a standing position or recumbent position (Telfah, Siddiqui and Taleb, 2012).

The routine castration process involves an incision over the scrotum at both sides and removing the testicle after ligation of the vascular portion of the spermatic cord and wounds are left open for

postoperative care like in equines (Chittora *et a*l., 2020). The recently developed pre-scrotal midline incision method does not require any postoperative care (Telfah, Siddiqui and Taleb, 2012). Primary bleeding may be a potential complication if the vascular portion of the spermatic cord is not properly ligated or emasculated and in cases where the surgical procedure is not performed according to the standard surgical principles, infection of the surgery site may take place necessitating meticulous postoperative care. In rare instances, the formation of unilateral or bilateral scirrhous cord as a result of chronic infection may necessitate an elaborate second surgical procedure (Moretti, 2008).

Unlike in horses, there is negligible postoperative drainage in the camel following open castration. This precluded the need for postoperative care as compared to when the scrotal wounds were left open (Chittora *et al*., 2020). However, in a lately modified technique and instead of two incisions; a single, small pre-scrotal midline incision was used to exteriorize both the testicles through it and the incision was closed with one interrupted horizontal mattress suture using absorbable suture material of the proper size and assumed to give encouraging outcome and relatively cosmetic, due to small scar in the pre scrotal midline region (Telfah, Siddiqui and Taleb, 2012). This case report was aimed to describe the surgical sterilization of the dromedary camel by open castration through two parallel scrotal incisions using a spermatic nerve block.

***Case history and clinical examination*:** A 7-year-old bull dromedary camel weighing ~400kg was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of recurrent swelling of the left testicle since a month. The problem was treated medically using Penstrep, 1ml/20kg, IM, SID for 5 days at VTH before three weeks and the swelling was regressed for some period of time but re-occurred again, then referred for surgical treatment. Upon clinical examination and palpation of the testicle, the left testicle was enlarged, hot, and painful to touch (Figure 4A). Based on history and systemic physical examination the case was diagnosed as unilateral orchitis and admitted for open castration of both testicles using local anesthesia.

***Pre-operative preparation*:** The camel was controlled in sternal recumbence with physical restraint, the tail was tied to the side using gauze and the scrotal area was prepared aseptically by washing, shaving and scrubbing with diluted tincture iodine. Appropriate precautions was taken into account to prevent infection with pathogenic organisms like Brucella.

***Anesthesia and animal control*:** The animal was restrained in sternal recumbence using a rope tied to its legs by passing over its neck and hump. Then, 2% lidocaine hydrochloride @ 0.5mg/kg, was injected into each testicle for spermatic nerve block.

***Surgical procedure and technique*:** The right testicle was grasped caudoventrally between the thumb and index finger of the left hand and a 3cm vertical incision was made over the mid part of the scrotum (Figure 4B). The testicle was exteriorized through the incision line, then the parietal vaginal tunic was incised to allow direct ligation of the spermatic cord (Figure 4C). Three hemostatic forceps were placed on the spermatic cord and the cord was double ligated by circumferential transfixation ligatures using absorbable suture material PGA size # 2 (Figure 4D). Then the testicle was removed by severing the cord between the middle forceps and one closest to the testicle. The opposite testicle was exteriorized from the other parallel incision and removed in the same manner. After the removal of both testicles, procaine penicillin powder was applied to the surgical wounds and the surgical wound was left open to heal by second intention (Figure 4E).


**Figure 4:** Open castration in bull dromedary camel

A) Unilateral swelling of the testicle B) Scrotal incision parallel to the median raphae
C) Incision into parietal tunic layer D) Application of three heamostatic forceps
E) The surgical area at the end of operation F) Recovered camel during the follow up

***Post-operative care and outcome*:** Post operatively broad-spectrum antibiotic Penstrep, @1ml/20kg, IM, SID and anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.1mg/kg, 10ml, IM, SID were administered for three successive days. The surgical wound was dressed with antiseptics at day intervals for three days. Finally, the camel recovered uneventfully after one week of regular follow-up (Figure 4F).

**Discussion**

Castration of male camels is one of the routine management surgical practices throughout the world. It is mostly performed in order to reduce their aggressive behavior, especially during the rutting season, and testicular diseases (Moretti, 2008). Similarly in the present case management, it was performed for the treatment of recurrent unilateral orchitis. In most males, castration is recommended at 2 years of age however; earlier castration (6 months) is also possible (Telfah, Siddiqui and Taleb, 2012). But in the current case report the camel was seven years aged. Several types of anesthetic regimes can be used including chloroform, etorphine with acepromazine, chloral hydrate, and xylazine.

In field conditions, the best results for security (and lower cost) are sedation with xylazine and local anesthesia (Chittora *et al*., 2020). However, in the case at hand, the camel was restrained physically in a sitting position and local anesthesia 2% lidocaine hydrochloride was infiltrated intra-testicular. This case management is also similar to the technique used by the authors (Lapidge, Eason and Humphrys, 2010) the camel was controlled properly and the scrotum is injected with 2% lidocaine solution 3 to 5 cm cranial to the scrotum on either side of the median raphae. Castration using the Burdizzo method has been used in the past but is now abandoned in favor of the complete removal of the testis. So, the technique used nowadays is similar to standard methods used in other species (Larson, 2007).

In the present case, two skin incisions were made parallel to the median raphae through which the testicles were exteriorized, transected, and the scrotal incisions were left open to allow drainage. A similar surgical technique was reported by the authors (Chittora *et al*., 2020). Different

approaches are used in camel castration. Of these, a pre-scrotal castration technique is preferred due to its esthetic and limited surgical scar (Telfah, Siddiqui and Taleb, 2012). However, in the current case pre-scrotal technique wasn't applied due to the absence of deep sedation. Generally, in the present case report, open castration using two scrotal incision techniques was successfully conducted in the dromedary camel without any complications.

### *3.1.3.Ovariohysterectomy in bitches*


**Abstract**

Ovariohysterectomy is the surgical removal of ovaries and uterus conducted in female animals. It is conducted in bitch to control the population of stray dogs thereby preventing inter and intra-species disease transmissions. In the current case report, two local breed bitches were presented to Addis Ababa University College of Veterinary Medicine And Agriculture, Feseha Gebre Ab VTH for permanent sterilization of the bitches. Up on clinical examination, both bitches were apparently healthy, alert, and fit for spaying. The bitches have fasted overnight and ovariohysterectomy was conducted under general anesthesia using the caudal ventral midline approach. Post-operatively systemic antibiotic and anti-inflammatory drugs were administered for three consecutive days. The surgical wound was also dressed with antiseptics for three days. The owners were advised to apply an Elizabethan collar and restrict exercise for the first two weeks. Finally, both bitches had uneventful recovery after the two weeks regular follow-up period.



**Keywords:** *bitch, general anesthesia, ovariohysterectomy, ventral midline incision*


**Introduction**

Ovariohysterectomy (OVH) is the surgical removal of the ovaries and uterus of female pet animals like dogs to control the overpopulation of stray dogs thereby preventing inter-and intra-species disease transmissions. It is also indicated in cases of Pyometra, uterine tumors, or other pathologies (Asrat and Melkamu, 2018). It is one of the most routinely performed major reproductive surgeries in the veterinary practice due to its reliability in pet population control (Lee *et al*., 2013). However, the procedure is contraindicated if the bitch presents a generalized condition with hypothermia and dehydration (Bencharif *et al*., 2010a). For routine spaying of dogs, the best age is before puberty (4.5 to 9 months of age).

Right flank laparotomy and caudal ventral midline celiotomy are common incision approaches in bitches. The traditional OVH usually is accessed through a caudal midline incision, which frequently encompasses the half or the middle third of the distance between umbilicus and pubis (Acharya *et al*., 2016). Whenever it is necessary to perform an OVH on a lactating animal, using the lateral flank approach can avoid potential complications that may be associated with the ventral midline approach, such as excessive hemorrhage from the skin and subcutaneous tissue, wound inflammation or infection, and leakage from mammary tissue. In addition, using the lateral flank approach in lactating animals minimizes disruption to the mammary glands so that animals are more likely to continue nursing appropriately after surgery (Mwangi *et al*., 2018).

The midline approach is preferable, predominantly because the uterus sometimes cannot be identified from the flank approach, and it is difficult to be certain whether this is a technical problem or the dog has already been neutered, without exploring from a midline approach. Certain rare congenital abnormalities, such as uterus unicornis, may also be difficult to identify or deal with from the flank approach. With the flank approach, if the ovarian or cervical pedicles are lost before they are ligated, they may be difficult to recover (Tallant *et al*., 2011). An efficient anesthetic protocol is mandatory to prevent pain and to provide immobility and muscle relaxation without jeopardizing the life and safety of the animal (Murugesan *et al*., 2020). Specific and non-specific complications such as hemorrhage, adherences, urinary incontinence, and return to oestrus including repeat surgery can occur following spaying. After an OVH, bitches tend to put on weight, it is, therefore, important to inform the owner to reduce the daily ration by 10 % (Pereira *et al*., 2018). The present surgical case report is aimed to describe the successful ovariohysterectomy conducted in two bitches through the ventral midline approach.

***Case history and clinical examination*:** Two intact local breed bitches weighing 8kg were presented to Addis Ababa University College of Veterinary Medicine And Agriculture, Feseha Gebre Ab VTH for permanent sterilization to prevent breeding. The first case (case 1) was a 3 years old bitch with a history of no parity, vaccinated against rabies, and has no history of recent illness. The owner decided to sterilize the bitch to prevent unwanted breeding. The second case (case 2) was a two years old local breed bitch with a history of giving birth to 8 puppies during the first parity with normal delivery and presented for permanent sterilization. Upon thorough physical examination, both bitches were found apparently healthy and fit for spaying.

***Pre-operative preparation*:** Since both surgeries were elective and appointed both bitches have fasted overnight before surgery. After sedation, the bitches were restrained in dorsal recumbence. The ventral abdomen between the umbilicus and pubis was clipped, shaved, washed, and scrubbed with tincture-iodine 2%, and a sterile drape was fixed over the body with a towel clamp (Figures 5A and 6A). An 18 gauge intravenous catheter was secured on the cephalic vein and ringers lactate solution 200ml was infused @ 10ml/kg/hr.

***Anesthesia and animal control*:** The bitches were first sedated with diazepam @ 0.5mg/kg, IV. Then general anesthesia was induced with intravenous administration of a xylazine-ketamine combination @ 1mg/kg and 5mg/kg respectively. Anesthesia was maintained with the same protocol given at half of the induction dose during the surgery. Both bitches were controlled in dorsal recumbence on the slightly tilted operation table to allow the abdominal viscera to move forward with the four limbs tied to the surgical table.

***Surgical procedure and technique*:** In both cases, a 6-8 cm long midline incision was made on the ventral aspect of the abdomen beginning 2-3 cm behind the umbilicus and ending a few centimeters in front of the pubis (Figure 5B). Using scissors, the subcutaneous tissue is bluntly dissected to visualize the linea alba. Then linea alba was grasped using rat-tooth forceps, in the middle and tented up, stab incision was made by scalpel blade and advanced with scissors in both cases. Hemostasis is achieved before opening the abdominal cavity using mechanical pressure and artery forceps. Then peritoneum was opened to visualize the abdominal cavity. The left uterine horn was located by the index finger and the left uterine horn is then followed cranially to the left ovary. The left ovary is brought to the abdominal incision by caudal ventral traction on the left uterine horn. The ovarian suspensory ligament was stretched and broken by a finger to allow easier manipulation of the ovary. After the ovary was sufficiently exteriorized to the abdominal incision, a window was made in the mesovarium caudal to the ovarian vessels, and three hemostatic forceps were applied on the vascular pedicle of the ovary (Figure 5C). Then circumferential ligatures were applied beneath the middle forceps and beneath the most distal forceps away from the ovary using PGA #2 (Figure 6B). Then the pedicle was transected between the middle forceps and forceps closest to the ovary.

The distal forceps were removed and the pedicle stump was checked for bleeding and then replaced in the abdomen. The same procedures were repeated on the right ovary and ovarian vascular pedicle. The broad ligament (mesometrium) was torn to allow elevation of the horns and

uterine body. The uterine vessels located on each side of the uterine body were ligated using PGA #3-0 and transected proximal to the cervix. Three hemostatic forceps were placed on the uterine body just cranial to the cervix. Then a circumferential ligature was applied beneath the forceps closest to the cervix using absorbable suture material PGA #2. The uterine body was transected between the middle forceps and the one closest to the uterus (Figure 5D). Then the forceps were removed and the uterine stump was inspected for bleeding and replaced in the abdomen. The abdominal incision was closed in three layers. Peritoneum and linea alba was sutured with a continuous lock stitch suture pattern using absorbable suture material PGA # 2. The subcutaneous tissue was closed with a simple continuous suture pattern using PGA #2-0 (Figures 5E & 6C). Then skin incision was closed with a subcuticular suture pattern using PGA #2 (Figures 5F & 6D). Finally, the surgical area was scrubbed with diluted povidone-iodine and the patient was monitored until full recovery from anesthesia.


**Figure 5:** Ovariohysterectomy in bitch through ventral midline incision

**Case 1**

A) Aseptic preparation of the surgical area B) Ventral midline incision

C) Three clamp on the ovarian pedicle D) Severing the uterus proximal to the cervix

E) Closure of subcutaneous tissue F) Skin suture in subcuticular suture pattern

G) Completely healed surgical wound after two weeks


**Figure 6:** Ovariohysterectomy through ventral midline incision in bitch

**Case 2**

A) Preparation of the surgical area B) Ligation of the ovarian pedicle
C) Linea alba closure in simple continuous pattern D) Skin closure in subcuticular pattern
E) Completely healed incisional wound after two weeks F) Fully recovered bitch during follow up

***Post-operative care and outcome*:** Post-operatively Penstrep, 1ml/10kg, IM, qd and antipain Dexamethasone sodium phosphate injection, 0.5mg/kg, IM, qd were administered for three successive days. The surgical wound was also dressed with antiseptics for three days. The owners were advised to apply an Elizabethan collar and minimize exercise for the first two weeks. The

incisional wounds were healed without any complications (Figures 5G and 6E) and the bitches were completely recovered (Figure 6F) after two weeks regular follow up period.

**Discussion**

Dogs are highly prolific and their population can be increased in a short period. Therefore, it is necessary to control street dogs in order to get rid of zoonotic diseases and other problems (Acharya *et al*., 2016). Ovariohysterectomy in bitch is a surgical procedure that is mostly conducted in veterinary practice (Bencharif *et al*., 2010a). It is indicated when the bitches are encountered with various reproductive tract pathological conditions, dystocia, and undesirable sexual behaviors. It is also important to induce irreversible sterilization of bitches thereby controlling the overpopulation of dogs and hence preventing diseases such as rabies transmission among different species of animals and human beings (Acharya *et al*., 2016). Similarly, in the current case report, the bitches were spayed to control unwanted pregnancies in both cases.

For routine spaying, the best age for bitch is before puberty or after any phase of the reproductive cycle. However, it is best performed either before puberty or during anoestrus, or after the animal has passed through one heat period (Asrat and Melkamu, 2018). In the present case report, the bitches were spayed during the anoestrus period which is the right time for adult bitches. The surgical operation was performed using injectable general anesthetics. Xylazine and ketamine mixed in the same syringe were used for induction as well as for maintenance. This is similar to surgical procedures done in small animals under general anesthesia by (Dongaonkar *et al*., 2019) and (Acharya *et al*., 2016).

Four commonly used sterilization techniques in bitches were written in literatures, these includesventral midline, laparoscopic, flank, and ovariectomy (Bushby, Brookshire and Shivley, 2020). Right flank laparotomy and ventral midline celiotomy are commonly practiced in bitches (Asrat and Melkamu, 2018). Easy access to the genital apparatus is gained via the ventral midline technique which provides direct access to the uterine horns and facilitates prehension of the ovaries (Bencharif *et al*., 2010b). In the present case management, ovariohysterectomy was performed through a ventral midline skin incision because it allows direct visualization of the abdominal cavity and easy access to the uterine horns. The same technique and procedure were used by the authors (Arunkumar, Dilipkumar and Shivaprakash, 2017; Acharya *et al*., 2016).

Ovariohysterectomy might present complications like anesthetic problems, hemorrhages, incisional hernia, delayed healing, abscesses, infections, and death (Janneth *et al*., 2018). According to reports, the incidence of surgical complications of canine OVH varies between 6.1 and 27.0%, regardless of the age of the animal, the skills of the surgeon, or the presence of reproductive disease. Intra-abdominal hemorrhage is the main cause of death after OVH, which occurs more frequently when dogs are sterilized while they are in heat, due to the influence of estrogen (Pereira *et al*., 2018). However, in the present case management, the bitches are not in heat and both cases had an uneventful recovery. Generally, the current case management technique is a novel technique that can provide humane methods of controlling dog overpopulation.

### *3.1.4. Cesarean section in bitch*


**Abstract**

Dystocia is a common small animal emergency. In the present case report twelve years old exotic, small breed bitch was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of delayed parturition. Whelping of one dead puppy 12 hours before admission to hospital was reported. During the physical examination the bitch was depressed, frequently licks the vulva, and putrid smelling black to greenish discharge comes out from the vagina. From abdominal palpation and the multiparous nature of the dogs' dead emphysematous fetus was suspected to be left in the uterine horns. On the basis of history and clinical examination, the case was diagnosed as dystocia due to partial primary uterine inertia, and a cesarean section was performed through a caudal midline incision under general anesthesia. Two fetuses (one dead and putrified) were removed from the uterine horns. The uterine incision was closed in a double-layer inversional suture pattern using absorbable suture material PGA #1 and the abdominal incision was closed in three layers using absorbable suture material PGA #1. Antibiotic and anti-pain were administered for three successive postoperative days and the bitch fully recovers after two weeks of the regular follow-up period.



**Keywords:** *bitch, cesarean section, dystocia, uterine inertia*

## Introduction

Dystocia, the difficulty in passing the fetus through the pelvic canal, is a common small animal emergency (Gendler, Brourman and Graf, 2007). Cesarean section is frequently performed in canines compared to large ruminants because of their small size, multiparous nature, a long duration of delivery, and the demands by the owner to deliver as many live puppies as possible due to commercial considerations (Jyothi and Rajesh, 2018). The dam's whelping date may be determined using breeding dates, time of luteinizing hormone (LH) peak, ovulation date, or the first day of diestrus. The gestation period in the bitch is approximately 57 to 72 days (average 65 days) when established using breeding dates (Beccaglia *et al*., 2016).

The direct measurement of progesterone decline and prostaglandin elevation is a more reliable indicator of parturition and any elevation in the bitch's temperature at the end of pregnancy without expulsion of fetuses could indicate dystocia (Veronesi *et al*., 2002). Normal parturition is divided into three stages with predictable signs of forthcoming labor (Beccaglia *et al*., 2016). Dystocia can be maternal or fetal in origin and maternal dystocia is encountered more frequently (Dolf *et al*., 2018). The most common maternal cause of dystocia is uterine inertia, the failure to expel a fetus from the uterus when no obstruction exists; it can be classified as primary or secondary and complete or partial.

Complete primary uterine inertia occurs when stage 2 labor fails to start and no puppies are delivered. Partial primary uterine inertia is defined as the initiation of normal labor but failure to deliver all puppies (Michel and Reichler, 2008). Protracted cases of dystocia characterized by fetal death could not be relieved through vaginal manipulation besides being subjected to cesarean section (Traas, 2008). Anesthetic and perioperative management of cesarean section are influenced by altered maternal physiology during pregnancy, differing pharmacokinetics and pharmacodynamics between the fetus and dam, and consideration of maternal well-being as well as viability and vigor of neonates (Ryan and Wagner, 2006).

The availability and experience of personnel, familiarity with various anesthetic techniques, and availability of anesthetic equipment also influence anesthetic protocol choices (Gendler, Brourman and Graf, 2007). Cesarean section can be safe and effective as long as there is familiarity with the particular anesthetic regime, knowledge of the physiological changes that are induced by pregnancy, and anticipation of any possible complications that might be encountered

(Bonington, 2019). General anesthesia provides optimal surgical conditions with muscle relaxation and immobility (Islam, 2019). Intravenous fluids should be given to the dam during the cesarean section to counteract the blood loss during the procedure and help maintain cardiovascular integrity (Peştean, 2018). The objective of the present case report is to describe the successfully conducted cesarean section through the ventral midline incision in bitch.

***Case history and clinical examination*:** A 12 years old exotic small breed bitch weighing 10kg was presented to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH for delayed parturition. The stillbirth 12 hours before admission, anorexia and restlessness was reported by the owner.

Up on clinical examination, the bitch was exhausted, frequently licks the vulva and putrid smelling black to greenish discharge comes out from the vagina. Respiratory and heart rate was increased, and rectal temperature was 38.20c. Hard masses were felt during abdominal palpation and the dog sits in a squatting position. On per-vaginal examination, the birth canal was found moist with bad odor discharges, but no fetus was presented to the pelvic outlet. The case was diagnosed as dystocia due to fetal-pelvic disproportion and an emergency cesarean section was decided to be performed under general anesthesia.

***Pre-operative preparation*:** The bitch was chemically and physically restrained in dorsal recumbence on the surgical table. The ventral abdomen was prepared aseptically by washing, shaving, and thorough scrubbing with diluted iodine solution. Penstrep, 1ml/10kg, was administered intramuscularly. Then 18G IV cannula was fixed to the cephalic vein and Ringers solution, 200ml was infused during the surgical procedure @ 10ml/kg/hr.

***Anesthesia and animal control*:** A pre-anesthetic, 2% xylazine hydrochloride @1.1mg/kg was administered intramuscularly and general anesthesia was induced by intravenous administration of combination of Diazepam @0.5mg/kg and ketamine @5mg/kg. The patient was controlled in dorsal recumbence with the limbs tied to the surgical table and sterile drape was fixed on the abdominal area by exposing the surgical site.

***Surgical procedure and technique*:** A 8cm long midline incision was made through the skin caudal to the umbilicus. The incision was advanced through the subcutaneous tissue, linea alba, and peritoneum gently to avoid uterine or neonatal lacerations (Figure 7A). The abdominal cavity

was carefully entered (Figure 7B), the gravid uterus was exteriorized and the remaining abdominal organs were packed off with a sterile drape to prevent peritoneal contamination with uterine content (Figure 7C). A stab incision was made with a scalpel blade on the avascular area of the ventral midline of the uterine body and the incision was extended with Metzenbaum scissors to sufficient length for easy removal of the fetus without a uterine tear (Figure 7D). All fetuses were manipulated to this incision for removal one by one. Two fetuses (one dead and putrified) were removed from one horn (Figures 7E and F) along with the entire fetal sac and placenta. Then, the uterus was palpated from the cervix to the ovaries for the left fetus if any. Then the uterine incision was closed with a double layer inversional suture pattern, Cushing followed by lambert using absorbable suture material PGA #1. The uterine body was checked for bleeding, lavaged with normal saline solution, and gently replaced in the abdominal cavity. The abdominal incision was closed in three layers. Linea alba and peritoneum were sutured with a continuous lock stitch pattern using absorbable suture material PGA #2. The subcutaneous tissue was closed in a simple continuous pattern and the skin was closed in a subcuticular pattern both using PGA #2-0 (Figure 7G). The incision site was scrubbed with diluted iodine solution. Finally, the bitch was carefully monitored until complete recovery from anesthesia and admitted home.

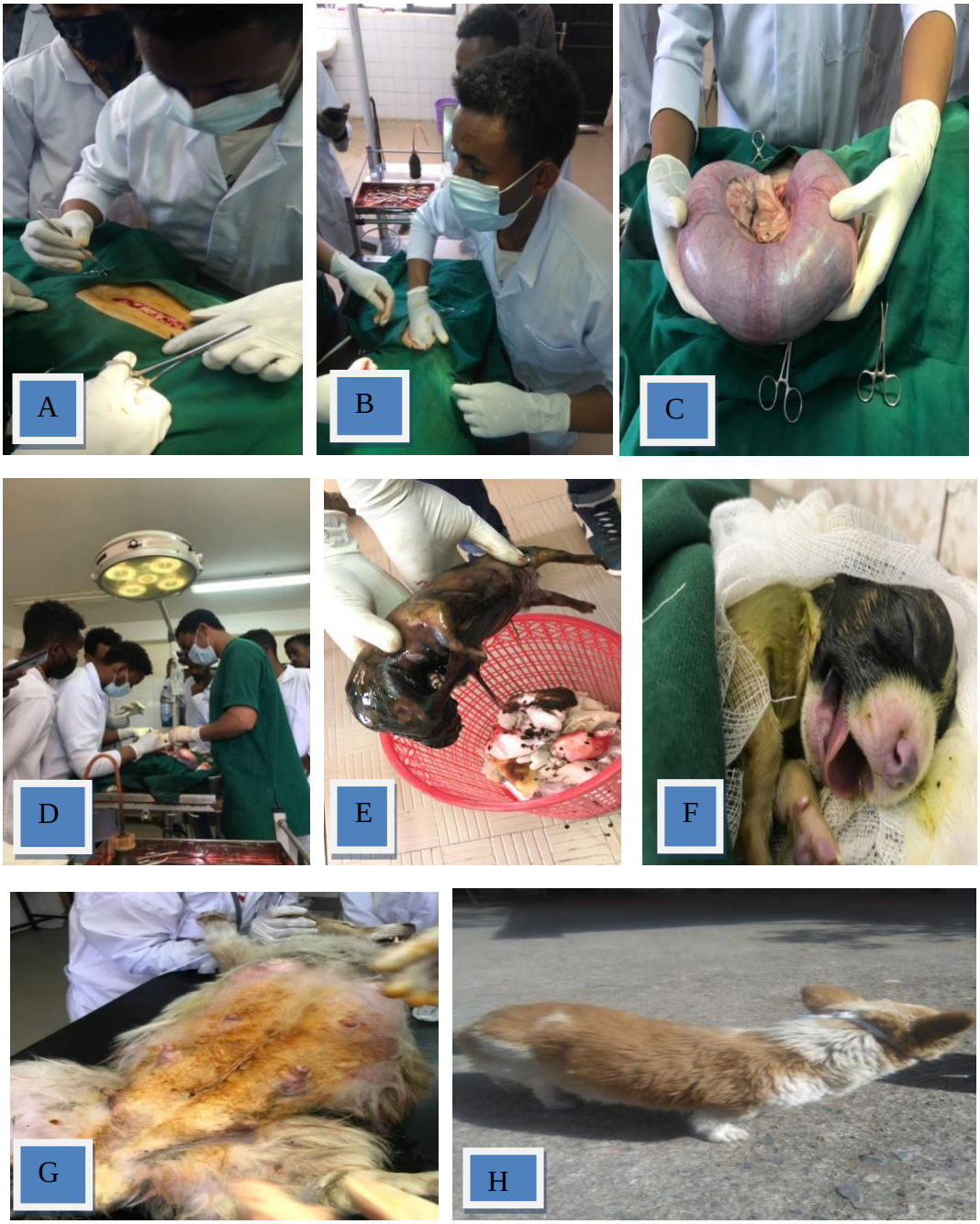



**Figure 7:** Cesarean section through ventral midline incision in bitch

A) Caudal ventral midline incision B) Gentle traction of the uterine horn

C) Exteriorized uterine horn D) Stab incision into the body of the uterus

E) Dead emphysematous fetus F) Live fetus

G) Skin closure H) The recovered bitch after two weeks follow-up period

***Post-operative care and outcome*:** Post-operation, Penstrep, 1ml/10kg, IM, SID, and antipain tramadol, 2mg/kg, IM, SID were administered for three successive days. The owner was advised to apply an Elizabethan collar. Seroma was formed at the surgical site during the follow-up period. Then the treatment was repeated with Ceftriaxone sodium injection, 15mg/kg, IM, SID for three days. Finally, the surgical area was successfully healed and the bitch was fully recovered after three weeks regular follow-up period (Figure 7H).

**Discussion**

Knowledge of normal parturition is required to properly identify dystocia (Smith, 2012). Normal gestation in the bitch is within a range of 56 to 72 days (average 63 days) from the date of first known breeding. The variability in gestation length is due to the long life span of the spermatozoa in the genital tract of the bitch (Beccaglia *et al*., 2016). The estimated prevalence of dystocia in the canine may vary between 3.7% and 5% (Bergström *et al*., 2006) and 60–80% of dystocia cases require surgical intervention (O'neill *et al*., 2017). According to (Smith, 2012) uterine inertia is the most common maternal cause of dystocia in older bitches, besides fetal to pelvic size mismatch. Similarly in the current surgical management cesarean section was conducted in 12 years old small breed bitch due to partial primary uterine inertia.

Indications to perform an emergency cesarean section includes fetal distress (fetal heart rate on ultrasounds <180 beats per minute), primary and secondary uterine inertia, and obstructive dystocia (Batista *et al*., 2014). According to reports of the author (Traas, 2008), risk factors for dystocia include breed, age of bitch, parity, litter size, and body size of bitch. Older primiparous bitches (>6 years of age) have a significantly increased risk of having problems during parturition and have an increased incidence of stillbirths. This is in agreement with the current surgical case in which a 12 years old, primiparous, small breed bitch with a history of stillbirth undergo cesarean section and brachycephalic breed puppies were removed.

An elective cesarean section permits advanced preparation of the patient for anesthesia and surgery to minimize the risk of anesthesia to the dam and fetus (Devroe, Van De Velde and Rex, 2015). However, in an emergency cesarean section withholding of feed prior to anesthesia is not possible but, fortunately, the fact that animals usually refuse to feed after the onset of labor helps to reduce complications (Gendler, Brourman and Graf, 2007). The current case was conducted on

an emergency basis but, the anesthetic complication was not happening because the bitch has already refused to feed 12 hours before admission.

Although there is no standard surgical approach to the cesarean section of dogs, the caudal midline approach is more commonly performed than the flank approach because the flank approach has potential complications due to difficulty in exteriorizing the entire uterine body and incision of several layers (Jyothi and Rajesh, 2018). Similarly in the current case management, the caudal midline incision was performed to easily exteriorize the uterine body and to get the advantage of decreased bleeding from linea alba. The anesthetic protocol used in the current case management is in agreement with the protocol described by (Jyothi and Rajesh, 2018). In the present case management, the dead fetus was removed by cesarean section from the uterus and it is in agreement with the findings of the author (Traas, 2008) which states that the main reason for the lack of expulsion of the dead fetus may be due to partial primary uterine inertia which is common in canine species. Generally, the present case report adressed that cesarean section through the caudal midline incision is a novel technique for the management of dystocia in bitch.

*3.1.5. Cesarean section in cow*

**Abstract**

Cesarean section is a surgical procedure performed in order to deliver a fetus when normal parturition is too difficult or could endanger the dam and or calf's life. The objective of the present case report is to describe the surgical management of dystocia in seven years old cross breed cow conducted on-farm in Bishoftu town. The labor started nine hours before the surgical management. Up on clinical examination, the cow was recumbent, exhausted, and dehydrated; vaginal examination revealed two-finger dilatation of the cervix. Based on history and clinical examination the condition was diagnosed as dystocia due to incomplete dilatation of the cervix and a cesarean section was performed under local anesthesia. Through the left oblique incision, the medium-sized fetus was removed. The uterine incision was closed in a double layer of Cushing followed by lambert with absorbable suture material PGA #2. The laparotomy incision was closed in three layers; the peritoneum and transversus abdominis muscle were closed in a simple continuous suture pattern using PGA #2. Then the external sheath of the rectus abdominis muscle was closed in a simple continuous suture pattern using PGA #2 and the third layer of subcutaneous fascia and skin was closed in a horizontal mattress suture pattern using non-

absorbable suture material silk #1. Antibiotics and analgesics were administered for five successive days. The skin suture was removed on the 14th postoperative day. Finally, the cow had an uneventful recovery after a three weeks regular follow-up period.

**Key words:** *cesarean section, cow, dystocia, left oblique incision*

## Introduction

Dystocia is the condition in which the first or second stage of parturition is prolonged, making the delivery difficult or impossible and obviously assistance is required in resolving the condition (Regmi and Gautam, 2020). Dystocia can be maternal (improper cervical dilation, failure of uterine expulsive contraction (uterine inertia), and neoplasms of vagina, vulva, and uterus) and/or fetal (head deviation, forelimb flexion, breech presentation, dog sitting position, and fetal malformations such as hydrocephalus, ascites, anasarca, and hydrothorax) in origin (Ahuja *et al*., 2018). The incidence of dystocia is higher in heifers than in pluriparous cows (Ali and Amin, 2016). Dystocia in cattles has economic importance through calf loss, poorer subsequent reproductive efficiency of the dam, increased labor or veterinary costs, and occasional cow losses (Schuenemann, 2013).

Dystocia can be relieved by different obstetric methods, including manual traction, fetotomy, and cesarean section (Yohannes, Tesfay and Tesfay, 2018). Nowadays, the cesarean operation is one of the most common surgical procedures performed by veterinarians as a routine obstetric technique (Kamalakar *et al*., 2016). It has high maternal and fetal survival rates and often is less exhausting, speedier, and safer than fetotomy. Fetotomy should be applied only when the fetus is known to be dead. Forced extraction/traction delivery may cause severe trauma to the dam and the fetus (Regmi and Gautam, 2020). Eight surgical approaches are available for the bovine cesarean section which includes recumbent or standing left paralumbar laparotomy, recumbent or standing right paralumbar laparotomy, recumbent ventral midline laparotomy; recumbent ventral paramedian laparotomy, ventrolateral laparotomy, and the recumbent left oblique laparotomy. Each of these approaches varies in tissues involved and has its own advantages and disadvantages (Ahuja *et al*., 2018).

Selection of an approach for cesarean section mainly depends on the species of animals, the skill of the veterinarian, the type of dystocia, the cow's condition, the environmental conditions, and

the availability of assistance during surgery (Kamalakar, Devarathnam and Mahesh, 2018). Having three main goals that includes survival of the dam, survival of the fetus, and maintenance of fertility a prompt decision to perform a cesarean operation is important for optimum success. Ideally, it is carried out when a live calf cannot be delivered after 15-20 minutes of manipulation (Assad, Ahmad and Ashraf, 2015). The present case report is aimed to describe a cesarean section performed through the left oblique laparotomy incision in a cross-breed cow.

***Case history and clinical examination*:** The case was conducted on 7 years old cross breed cow at the private farm in Bishoftu town. The owner reported violent straining and overt abdominal discomfort for nine hours. The cow was in fifth parity with the previous four normal parturitions. During the clinical examination, the cow was recumbent, exhausted, and dehydrated. Some parts of the rectal and vaginal wall were prolapsed due to unproductive long-term straining (Figure 8A). Vaginal examination revealed two-finger dilatation of the cervix. Depending on the history and clinical examination the case was diagnosed as dystocia due to incomplete dilatation of the cervix and a cesarean section was determined to be conducted under local anesthesia.

***Pre-operative preparation*:** The animal was rehydrated with 5% DNS (5% Dextrose in 0.225% NS), 2000ml, @10ml/kg/hr. Dexamethasone sodium injection, @ 0.2mg/kg, and Penstrep, @1ml/20kg, were administered intramuscularly before the operation. The large area of the lower-left flank was aseptically prepared by shaving, washing, and scrubbing with povidone-iodine solution, and a sterile drape was covered over the abdominal area.

***Anesthesia and animal control*:** The caudal epidural anesthesia was achieved by injection of 2% lidocaine hydrochloride @ 0.5mg/kg, into sacrococcygeal space to prevent straining and movement of the tail. Local anesthesia at the surgical area was achieved with linear infiltration of 2% lidocaine hydrochloride in an oblique direction. The cow was controlled physically in right lateral recumbency.

***Surgical procedure and technique*:** About 30 cm long skin incision was made starting ~10 cm cranial and 10 cm ventral to the cranial aspect of the tuber coxae. The incision was extended cranioventrally at a 45-degree angle ending 3cm caudal to the last rib (Figure 8B). The external abdominal oblique muscle was incised parallel to the muscle fibers. The internal abdominal oblique muscle and transverse abdominis muscles were guided parallel to the incision using a combination of sharp and blunt dissection. Hemorrhage was controlled by clamping and ligation

of the bleeding points. Then, the peritoneum was incised carefully by guiding a cut with a finger placed underneath the peritoneum. By wearing the arm-length glove the lower abdomen was entered in search of the gravid uterus. After identifying the uterus, the portion of the uterus containing a hind limb was pulled up into the abdominal incision and locked gently (Figure 8C). Then incision was made along the less vascular parts of the uterus to avoid injury to major blood vessels. The medium-sized live male fetus was extracted by holding the hind legs (Figure 8D) and transferred to assistants. Then the loosely attached placenta was gently removed from the caruncles of the uterus. The uterine incision was closed in a double layer of Cushing followed by lambert using PGA # 2 (Figure 8E) and the uterus was replaced into the peritoneal cavity. The laparotomy incision was closed in three layers; the peritoneum and transversus abdominis muscle were closed in a simple continuous suture pattern using PGA #2. Then the external sheath of the rectus abdominis muscle was closed in a simple continuous suture pattern using PGA #2 and the third layer of subcutaneous fascia and skin was closed in a horizontal mattress suture pattern using non-absorbable suture material silk #1 (Figure 8F). Finally, the antibiotic cyclo-spray was applied to the surgical area.


**Figure 8:** Cesarean section through left oblique incision in cow

A) Recumbent and exhausted cow B) Oblique incision on the lower left flank

C) Locking of the hind limb through the laparotomy incision D) Extraction of the fetus E) Double layer closure of the uterus F) Skin closure by horizontal mattress pattern G) Recovered cow during the follow up

***Post-operative care and outcome*:** After surgery calcium borogluconate, 1000ml was administered intravenously to support the cow to stand. The broad spectrum antibiotic Penstrep, 1ml/20kg, IM, qd was continued for 5 successive days. The surgical wound was regularly dressed with mild antiseptics for five days. The skin suture was removed on 14$^{th}$ post-operative day and the cow was recovered successfully after three weeks regular follow up period (Figure 8G).

**Discussion**

Cesarean section is a routine obstetric procedure in cattle due to high maternal and fetal survival rates. Following cesarean section, the survival rate of the dam has been recorded at 64.7 - 100% if the operation is performed within 24-26 hours of dystocia (Regmi and Gautam, 2020). This is in agreement with the present case management in which a cesarean section was conducted within 10 hours of dystocia and the cow survived. The procedure was conducted under local anesthesia through a left oblique laparotomy incision which is in line with the technique stated by the authors (Kamalakar, Devarathnam and Mahesh, 2018). The most common causes of dystocia that necessitate cesarean section include immature heifers, pelvis deformities, failure of cervical dilation, un-correctable uterine torsion, uterine tear, hydrops, prepartum paralysis, absolute oversized fetus, malposition and pathological fetal conditions (Jos, 2020).

Cesarean section can be performed in a standing or recumbent position both having advantages and disadvantages. In the case of standing position closure of the abdominal wall is straightforward and relatively easy, less assistance is necessary (Newman and Anderson, 2018). On the other hand, the recumbent approach facilitates exteriorization of the uterus, especially when an oversized fetus is present, and reduces the opportunity to contaminate the abdominal cavity (Schultz *et al*., 2008). The left oblique approach permits exteriorization of the uterus, making it suitable for the removal of a large emphysematous fetus. But in the upper left flank approach, it is often difficult to exteriorize the uterus because the gravid uterus falls away from the incision and wound closure is more difficult, due to increased tension on the muscle layers (Vermunt, 2011). In the present surgical management, the left oblique incision was conducted in a

recumbent cow because it allows easy exteriorization of the uterus to limit peritoneal cavity contamination with uterine contents, thereby aiding in the prevention of peritonitis.

When delivering a fetus in anterior presentation, a rear limb is grasped in the middle of the shaft of the metatarsus and the limb is pulled toward the incision, lifted through the incision, and the hock is wedged in the cranioventral aspect of the incision (Dhindsa *et al*., 2019). The same technique was used in the present case management. Sometimes sedation of the cow is required for cesarean operation (Newman and Anderson, 2018). However, in the current case, only local anesthesia was infiltrated into the surgical area using 2% lidocaine hydrochloride to reduce the anesthetic complications. During the closure of the surgical incisions, the uterus was closed by a double-layer inverting suture pattern; the peritoneum and abdominal muscles were closed by an appositional suture pattern and the skin was closed by a horizontal mattress suture pattern. This is in agreement with the techniques stated by the authors (Alagar *et al*., 2017).

Common complications associated with cesarean section include metritis, adhesions, peritonitis, hemorrhage, wound dehiscence, and poor fertility (Schultz *et al*., 2008). However, in the present case management appropriate post-operative care was provided and the cow had an uneventful recovery. In conclusion, this case report has highlighted the effective approach for surgical management of dystocia in a recumbent cow without post-operation complications.

*3.1.6. Cesarean section in queen*

**Abstract**

Dystocia in cats is a state in which the queen is unable to expel the fetus without manual assistance and/or medical or surgical interventions. This case report is aimed to describe the surgical management of dystocia in two queen cats that were presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH for delayed parturition. Based on history and clinical examination the case was diagnosed as dystocia due to uterine inertia and a cesarean section was performed under general anesthesia. A 5 cm long incision was made through the caudal midline and the gravid uterus was exteriorized. Then, two live kittens (case one) and three kittens (two dead) (case two) were removed through the incision of the uterine body. The uterine incision was closed in a double-layer inverting suture pattern using absorbable suture material and the celiotomy incision was closed in three layers using

absorbable suture material of appropriate size. Post-operation broad-spectrum antibiotics and anti-inflammatory drugs were administered, and the surgical wound was dressed with antiseptics for three successive days. Finally, both queens recovered successfully following two weeks of regular follow-up.

**Keywords:** *cat, cesarean section, dystocia, uterine inertia*

## Introduction

Parturition in small animals allows many opportunities for emergency intervention to become necessary. Therefore, knowledge of normal parturition is required for the emergency situation to be properly identified (Smith, 2012). Normal gestation period in the queen is with a range of 52 to 74 days (average 65 days) from breeding to the onset of parturition (Gilroy and DeYoung, 1986). Dystocia is a state in which the queen is unable to expel the fetus without manual assistance and/or medicinal or surgical interventions (Talukder, Das and Rahman, 2021). It can be caused by maternal factors like primary or secondary uterine inertia, pelvic fracture, uterine torsion, vaginal abnormalities such as bands, malnutrition, and parasitism or by fetal causes such as fetal monster, anasarcous fetuses, cephalopelvic disproportion, true fetal oversize or disproportion between fetal size and dam size, and fetal death (Jyothi and Rajesh, 2018).

In the queen, 67.1% of the dystocias are maternal and 29.7% are fetal in origin. Primary and secondary uterine inertia are the most common cause for dystocia of maternal origin, whereas malpresentation of the fetus is the most common cause of dystocia of fetal origin (Traas, 2008). Uterine inertia, can be classified as partial or complete, based on wether labor starts or not. In partial uterine inertia labor ends prematurely whereas in complete uterine inertia, labor period is unable to start (Michel and Reichler, 2008). Primary uterine inertia is more common in multiparous species (dogs and cats) in comparison to that in uniparous animal species, besides its incidence is also higher in primiparous animals than that in pluriparous (Samantha, 2015). Unlike large domestic mammals, the incidence of dystocia is fortunately quite low in queen, even lower than that in bitches. Dystocia occurs in approximately 3.3% – 5.8% of parturitions in queens and is an important cause of stillbirth (Talukder, Das and Rahman, 2021).

An efficient diagnosis of dystocia depends on taking an accurate history and performing a thorough physical examination in a timely manner (Talat Naoman, 2021). A complete physical

examination should be performed to assess overall maternal health. When in doubt, an abdominal radiograph is necessary whichwill allow the assessment of litter size (Smith, 2012). Depending on the causes, physical examination, diagnosis of the problems, and types of uterine inertia timely and appropriate interventions, either medical or surgical, are required for survival of the queen and kittens as well. The cesarean section must be performed as soon as feasible in case of destructive dystocia or when medical treatment fails or is not practicable (Jyothi and Rajesh, 2018). The aim of the present case report is to describe the surgical management of dystocia conducted in two local breed queens.

**Case history and clinical examination**

**Case 1:** A two years old local breed queen weighing 6 kg was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH for delayed queening. The queen is on the first parity andthe labor started 12 hours before presentation.

During clinical examination depression, frequent licking of vulva and screaming was observed. On per vaginal examination, the head of the first kitten was palpated in the vagina and dead kitten was delivered by gentle traction. During external palpation of the abdomen there were hard masses suggesting that there were other fetuses in the uterine horns. The queen was very exhausted and has made no attempt to deliver the fetuses.

**Case 2:** A three years old local breed queen weighing 10kg was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha G/Ab VTH with the compliant of delayed parturition. It was the third parity for the queen and the labor starts eight hours before admission to the hospital.

During clinical examination the queen was exhausted and made no attempt to deliver (Figure 10A). Per-vaginal examination with index finger shows no fetus found within the vagina. But, abdominal palpation reveals the presence of hard structures. Depending up on history and clinical examination the cases were diagnosed as dystocia due to partial (case 1) and complete (case 2) primary uterine inertia and cesarean section was decided to be conducted under general anesthesia.

***Pre-operative preparation*:** Penstrep, @1ml/10kg, IM was administered few hours before commencing operation. Then, 18 gauge IV catheter was secured on the cephalic vein and Ringers solution, 100ml was infused @ 10ml/kg/hr during the operation. The surgical area, the abdomen caudal to the umbilicus, was prepared aseptically by shaving, washing, and scrubbing with povidone iodine and sterile drape was fixed on the abdominal area (Figures 9A & 10B).

***Anesthesia and animal control*:** The queens were premedicated with Atropine sulphate @ 0.04 mg/kg, IM and general anesthesia was induced by intravenous administration of combination of Diazepam @ 0.5mg/kg and ketamine @ 5mg/kg. Then the queens were controlled on the operation table in dorsal recumbence with all limbs secured to the table (Figure 9A).

***Surgical procedure and technique*:** A 5-6 cm long incision was made on the ventral abdominal midline, starting 1 cm caudal to the umbilicus. Skin, subcutaneous tissue, linea alba, and peritoneum were sequentially incised (Figures 9B and 10C). The abdominal cavity was carefully entered with the right hand, the gravid uterus was exteriorized, and the abdominal cavity was packed off with a sterile drape to prevent peritoneal contamination with uterine content. A stab incision was made with a scalpel blade on the ventral midline of the uterine body in the avascular area (Figures 9C and 10D) and the incision was extended with Metzenbaum scissors to sufficient length for easy removal of the kittens. Then the fetus in the right horn was moved to the incision site and extracted by gently pushing and squeezing the uterine horn (Figure 9D). The umbilical cord was ligated and transected. Then the placenta was removed by gently pulling from the endometrium.

The fetus in the left horn was removed by the same procedure. Two live kittens were removed in case 1 (Figure 9E). Whereas, three fetuses (two dead) were removed in case 2 (Figure 10E). The uterine horns were checked to the level of the ovary for the left fetus if any. Then the uterine incision was sutured in a double-layer inversional suture pattern, Cushing followed by lambert using PGA #2 (Figures 9F and 10F). The uterine incision was checked for bleeding, and the uterus was returned to the abdominal cavity. The midline abdominal incision was closed in three layers. Peritoneum and linea alba was sutured with a continuous lock stitch pattern using PGA #2 (Figure 9G). The subcutaneous tissue was sutured in a simple continuous pattern using PGA #2-0 and the skin was closed using a subcuticular suture pattern using PGA #2 with a buried knot to

avoid licking of suture material and wound dehiscence (Figure 10G). Finally, the surgical area was scrubbed with diluted iodine solution and the queens were admitted home.


**Figure 9:** Cesarean section through ventral midline incision in queen

**Case 1**

A) Preparation of surgical area and animal control B) Caudal midline abdominal incision
C) Uterine incision D) Removal of fetus by gentle traction
E) Manual stimulation of respiration in kittens F) Closure of uterine incision

G) Closure of abdominal incision  H) The queen and her kittens on the seventh day post operation

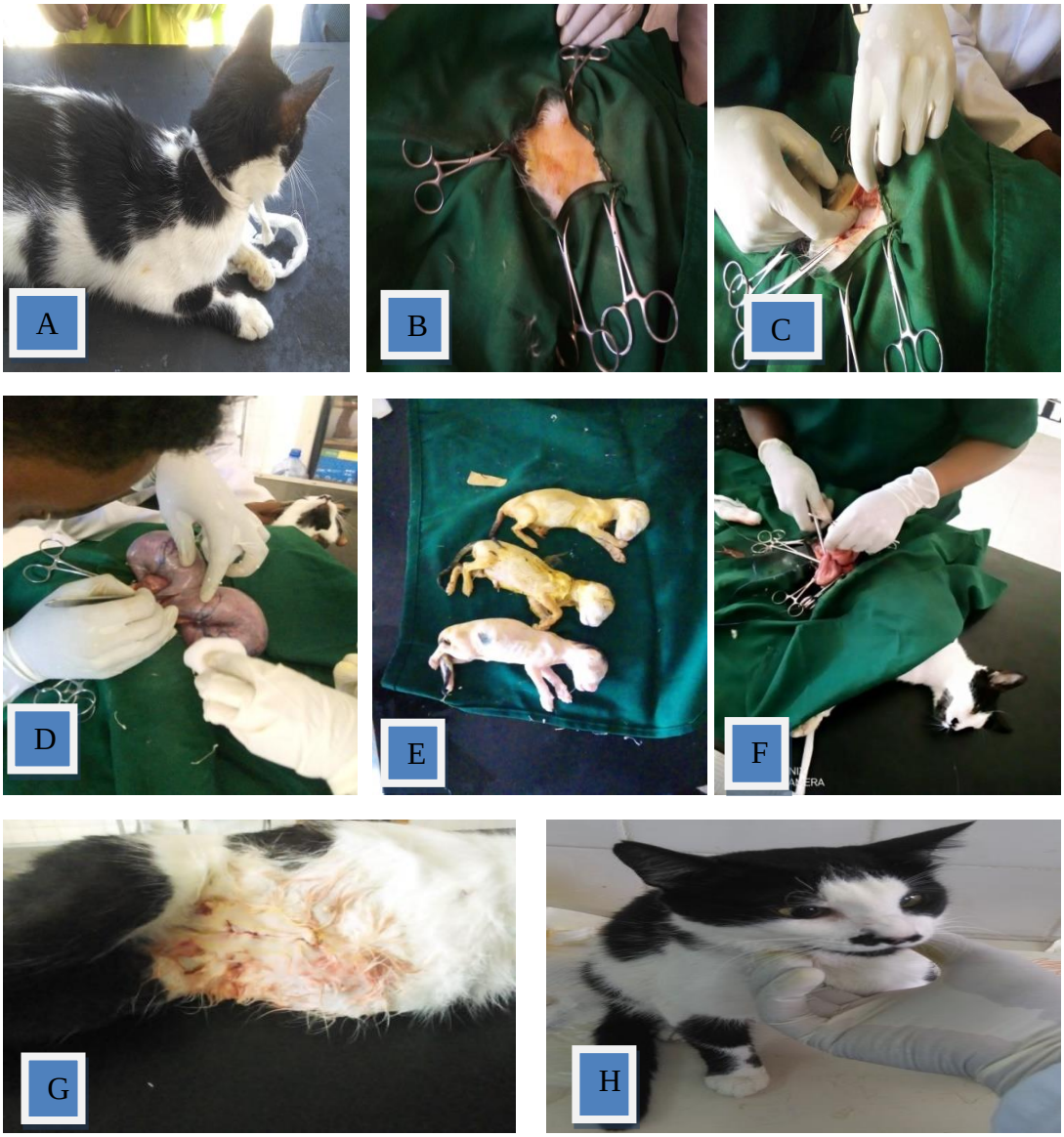



**Figure 10:** Cesarean section through ventral midline incision in queen

**Case 2**

A)  A distressed queen up on presentation  B) Aseptic preparation of the surgical area
C) A caudal midline incision into the skin and linea alba D) Incision of the uterine body
E) The delivered kittens  F) Closure of uterine incision by double layer inverting pattern
G) Skin closure by subcuticular pattern  H) Recovered queen one week post operation

***Post-operative care and outcome*:** After operation, Penstrep, 1ml/10kg, IM, qdand anti-inflammatory drug Dexamethasone sodium injection, 0.5mg/kg, IM, qd were administered for three consecutive days. The owner was also advised to apply Elizabethan collar. Wound healing was delayed due to licking of the surgical site in both cases and treatment was repeated with the mentioned antibiotic for three days. Finally, both queens were recovered successfully after one week regular follow up period (Figures 9H & 10H).

**Discussion**

Cases of dystocia that could not be relieved through vaginal manipulation were immediately subjected to cesarean section, the only line of treatment carried out in prolonged cases of dystocia (Jyothi and Rajesh, 2018). In the present case management, both queens were exhausted, and dystocia was relieved by emergency cesarean section. The queen cat is a sensitive and subtle animal, so all measurements to treat dystocia need gentleness, confidence, and complete physical examination before deciding on the dystocia treatment method (Talat Naoman, 2021).

In the present case, the cause of dystocia was diagnosed as partial primary uterine inertia in the first case and complete primary uterine inertia in the second case which was maternal in origin. This is in agreement with the findings of the authors (Talukder, Das and Rahman, 2021) that states the maternal origin of dystocia in the cat was considered the major percentage, and uterine inertia is a major cause of the maternal origin of dystocia. The outcome of a cesarean section mainly depends on the physical condition of the dam and how long she has been suffering from dystocia (Traas, 2008). In the present cases, cesarean section was performed after 12 and 8 hours of labor in the first and second cases respectively, and successfully save the life of the queens and their kittens.

The caudal midline approach predominates over the flank approach for the cesarean section of cats, because the flank approach has potential complications from difficulty in the exteriorizing entire uterine body and cutting several layers (Islam, 2019). This is in complete agreement withthe current case management in which cesarean section was performed through the caudal midline enabling easy access to the uterine body and minimum bleeding from linea alba. During the present case management, the queens were premedicated with atropine sulfate to reduce bronchial secretion and GIT motility. This is in line with the findings of the author (Smith, 2012)

which states that pre-anesthetic are normally recommended to decrease maternal stress and anxiety in addition to decreasing the doses of induction and maintenance of anesthetic agents.

The surgical procedure was carried out by anesthetizing the animal using the combination of diazepam @ 0.5mg/kg and ketamine @ 5mg/kg. This is in line with the findings of the authors (Jyothi and Rajesh, 2018; Bonington, 2019 ) which state that ketamine often has to be given with benzodiazepines, but contrary to the findings of the author (Traas, 2008) which concludes that alpha-2 agonists, ketamine, thiobarbiturates, and methoxyflurane are known to be detrimental to puppy viability, and should be avoided. An ideal anesthetic protocol for cesarean section should meet the maternal,fetal,and operative requirements like immobility of the patient and muscular relaxation (Smith, 2012). This is in agreement with the current protocol in which both the queen and the kittens readily recover from the effects of anesthesia after surgery. Following cesarean section, newborns are severely depressed in contrast to normal delivery and may require resuscitation. Therefore, before starting a cesarean section, assisting staff and sufficient equipment and material should be prepared (Talat Naoman, 2021).

In the current surgical management, successful newborn resuscitation was conducted by providing heat, suction of fluid from the mouth, and respiratory stimulation. The dam and puppies should be reunited as soon as clinically possible, with monitoring and support continued as needed (Bonington, 2019). Generally, the present surgical management claim that cesarean section through caudal midline incision is a novel technique to ensure the welfare of the dam and newborns in the queen.

### *3.1.7. Repair of vaginal prolapse in cow*

**Abstract**

Genital prolapse is the eversion of the pelvic genital organs such as the vagina, cervix, or uterus as a protrusion through the external genitalia. The objective of the present case report is to describe the surgical management of recurrent vaginal prolapse in six years old cross breed cow conducted on-farm in Bishoftu town. From the history, the problem was re-occurred after eight months of repair by a local veterinarian. During the clinical examination, the prolapsed vagina was contaminated with fecal material, swollen, and edematous. The cow was restrained in a standing position and caudal epidural anesthesia was achieved by injection of 2% lidocaine hydrochloride

into the sacrococcygeal space. Then the prolapsed mass was washed with lukewarm water and sodium chloride solution then debrided and lubricated by chlorhexidine solution. The mass was gently pushed and replaced into its normal anatomical position. Then, two interrupted horizontal mattress suture using silk size #1 along with two sterile plastic strips in bilateral configuration was applied to prevent a recurrence. Post-operatively penstrep and diclofenac sodium injections were administered intramuscularly for 3 consecutive days. The retention suture was removed on the 7th post-operation day. Finally, after two weeks of regular follow up the cow was recovered successfully.

**Keywords:** *vaginal prolapse, cow, epidural anesthesia, retention suture*

## Introduction

Genital prolapse is a major but rare reproductive disorder in cattle and buffaloes (A. Kumar *et al.*, 2018). It is coming out of one or more of the pelvic structures like bladder, uterus and vagina from their normal anatomical position through the vaginal opening (Bhattacharyya *et al.*, 2012). It is considered as an emergency condition and should be managed before excessive edema, mucosal trauma, contamination and fatal haemorrhage lead to a grave prognosis (Parikh *et al.*, 2018). Vaginal Prolapse (VP) is one of the common reproductive disorders of ruminants mainly cow, buffaloes, sheep and goats in late gestation and rarely occur post parturition, but the incidence and symptoms have been extensively observed in cows (Dewry *et al.*, 2015). Vaginal prolapse mostly happened in cross breed cattle before calving, usually in the last trimester of pregnancy (Kolangath *et al.*, 2020), but there was also evidence of post oestral vaginal prolapse in a non-pregnant heifer (Parikh *et al.*, 2018). This obstetrical problem has adverse effects on productive and reproductive performance of the animal by affecting postpartum return to oestrus, conception rate and calving interval (Balamurugan *et al.*, 2018).

There are various predisposing factors associated with VP including severe straining at prepartum due to expulsion of fecal materials, increased intra-abdominal pressure at advanced pregnancy, enlarged rumen making the ligaments fragile around perineum, high level of blood oestrogen around parturition and deficiency of certain macro or micro minerals (Kitessa and Terefe, 2021). VP should be treated immediately before there may occur any trauma or laceration to prevent haemorrhage or bacterial infection and sometimes infertility in subsequent pregnancy (Nayak and Samantara, 2010). An animal with VP treated promptly recovers without complication while

delay treatment could result in death of the animal. Success of treatment depends on the type of case, the duration of the case, the degree of damage and contamination (Dewry *et al.*, 2015).

The recovery of vaginal prolapse depends on early diagnosis, immediate replacement of vagina and assurance of further recurrence (Anil, Rajashri and Reddy, 2017). The management and correction of a VP usually involves disinfection and washing the prolapsed organ, reduction in size of edematous with glycerol, replacement of organ and application of stay sutures such as Buhner's sutures, shoe lace sutures, and vaginopexy (Kitessa and Terefe, 2021). The currently most favoured retention technique is Buhner's subcutaneous perivulvar suture application using vetafil or umbilical tape. However, under field conditions vetafil is very costly and umbilical tape is not readily available in sterile form (Bhattacharyya *et al.*, 2012). Retention (prevention of recurrence) can be achieved by application of rope truss technique following standard operational procedure described by (Kumar Sarma, Das and Nath, 2017). This case report is aimed to highlight the surgical repairof recurrent vaginal prolapse in a cross breed cow.

***Case history and clinical examination*:** A six years aged cross breed cow weighing ~200kg was reported to have the problem of recurrent vaginal prolapse on farm in Bishoftu town. The owner complained that the problem was re-occurred after eight months of repair by local veterinarian.

Up on clinical examination the prolapsed vaginal wall was contaminated with fecal debris and edematous. The cow was straining aggressively (Figure 11A). All the vital parameters were within the normal physiological range.

***Anesthesia and animal control*:** The cow was restrained physically in standing position with the help of two attendants (Figure 11B). The caudal epidural anesthesia was achieved by injection of 2% lidocaine hydrochloride, @ 0.5mg/kg, into the sacrococcygeal space.

***Pre-operative preparation*:** The prolapsed mass was washed with lukewarm water and chlorhexidine solution to remove the debris. Then sodium chloride solution was applied to reduce edema of the prolapsed mass. The tail of the cow was tied to the side to prevent contamination and for easy manipulation of the prolapsed mass.

***Surgical procedure and technique*:** After appropriate preparation the prolapsed mass was manually replaced into the pelvic cavity by gentle pushing with gloved hand while simultaneously

elevating the mass with the palm of the other hand. Then, two horizontal mattress retention suturewas applied at the base of the vulvar lips using silk size #1 along with bilateral configuration of slightly rectangular sterilized synthetic plastic material to prevent reccurence (Figure 11C). The cow relieved by urinating immediately after the prolapse was corrected (Figure 11D).


**Figure 11:** Repair of vaginal prolapse in cross breed cow

A) Clinical presentation of the prolapsed mass
B) Restraining of the cow in standing position
C) Application of retention suture after gentle repositioning of the mass
D) The cow able to urinate immediately following repair

***Post-operative care and outcome*:** The cow was administered Penstrep, 1ml/20kg, IM, qd and Diclofenac sodium injection (75mg/3ml), 2mg/kg, IM, qd for 3 consecutive days. The owner was advised to provide a good quality and balanced ration to the animal. Retention suture was removed on the $7^{th}$ post-operation day and following the two weeks regular follow up period the cow was recovered successfully without recurrence.

## Discussion

Genital prolapse, including vaginal prolapse in ruminants, is considered as an emergency maternal disorder that needs immediate correctionbefore any further complication that can lead to grave prognosis (A. Kumar *et al.*, 2018). The etiology of vaginal prolapse in cow is not clear. However, over relaxation of pelvic structure, flaccid uterus, and hyperestrogenism are considered as predisposing factors (Patra *et al.*, 2014). In the present case management the recurrent cervico-vaginal prolapse was occurred in a milking cow seven months postparturition and corrected within 24 hours of prolapse. The genital prolapse commonly occurs during last trimester of pregnancy particularly in pluriparous animal as compared to heifer (Parikh *et al.*, 2018). In the present case however VP occurs seven months following parturition and it is related to rumen distension.

The aim of the VP repair is to replace the organ with the method that can hold it in a fixed position (Balamurugan *et al.*, 2018). This is in line with the present case management in which retention sutures were placed using two horizontal matress sutures at the base of vulvar lips. Epidural anesthesia is mandatory before handling of prolapse mass as it leads to tenesmus. In such case, caudal epidural block using lignocaine hydrochloride (2%) provides satisfactory regional analgesia which prevents straining (Parikh *et al.*, 2018). This is in agreement with the present case management in which caudal epidural anesthesia was achieved using 2% lidocaine hydrochloride. It has been reported that for successful management of VP various authors used surgical or nonsurgical techniques (Dewry *et al.*, 2015) and medicines (Al-saeed, Abd and Al-maliki, 2017), but the results varied among the studies.

Moreover, VP was successfully managed by using retention suture or Buhner's suture technique (Patra *et al.*, 2014). Similarly in the present case management, retention suture was applied by two horizontal mattress stiches and found to be very satisfactory in preventing recurrence of the prolapse and prevent repeated costly treatment of the cow. This technique is in agreement with the reports of (Fesseha and Kidanemariam, 2020), but different from the previous reports of (Bhattacharyya *et al.*, 2012; Kumar Sarma, Das and Nath, 2017) that used Vetafil, Umbilical tape, Finlayson thread, and nylon suture material to prevent recurrence. Generally, the current case report describes the successful and relatively less costy technique of surgical correction of vaginal prolapse in cow.

*3.1.8. Repair of uterine prolapse in cow*

**Abstract**

Uterine prolapse is a common obstetrical problem, which adversely affects the reproductive and productive performance of cattle. This case report is aimed to describe the surgical management of post-parturient uterine prolapse in a two years old primiparous cross-breed cow conducted at a private farm in Bishoftu town. From the history, the uterine prolapse occurred two days post-parturition of a large-sized calf by manual traction. On clinical examination, the large uterine mass was hanging through the vulva, become edematous, contaminated with fecal materials, and the necrotized fetal membrane was hanging on the prolapsed uterus. The cow was restrained in a standing position by elevating the hind quarter and the caudal epidural block was achieved by injecting 2% lidocaine hydrochloride into the sacrococcygeal space. Then after the prolapsed mass was cleaned and debrided thoroughly it was replaced in the pelvic cavity step by step starting from the periphery by gentle pressure using both hands while the assistant holds the mass upward. Two horizontal interrupted retention sutures were applied along with sterile threaded gauze in bilateral configuration to prevent a recurrence. Post-operatively the cow was administered penstrep and dexamethasone sodium injection for three consecutive days. The retention suture was removed on the 7th post-operative day. Finally, after two weeks regular follow up the cow shows uneventful recovery.

**Keywords:** *cow, post-partum, retention sutures, uterine prolapse*

**Introduction**

Uterine prolapse is the protrusion of the uterus from the vulva with the mucosal surface exposed (Patil *et al.*, 2018). Post-partum uterine prolapse is an obstetrical complication that occurs 48 to 72 hours after parturition (Umaru *et al.*, 2013). Various predisposing factors such as hypocalcaemia, prolonged dystocia, fetal traction, fetal oversize, retained fetal membranes, chronic disease, and paresis have been suggested for uterine prolapse in the cow (Maruf *et al.*, 2014). Uterine prolapse has been recorded in all species of animal, although most commonly seen in pluriparous dairy cows. Incidence of post-partum uterine prolapse varies from 6.6 % to 12.9 % in cow (Paul *et al.*, 2017) and it has been suggested that the condition is rare in the Zebu cattle (Umaru *et al.*, 2013). A uterine prolapse can vary in size from about 18 inches to 3-4 feet in a large cow (Senthil and Yasotha, 2015).

The affected cows are usually recumbent and if in lateral recumbency, ruminant tympany usually results, but occasionally the cow will be standing with the everted organ hanging down almost to its hock (Firdaus *et al.,* 2016). The prolapsed mass become enlarged and edematous within a few hours. Some animals will develop hypovolemic shock, secondary to internal blood loss, laceration of the prolapsed organ or incarceration of abdominal viscera (Padheriya *et al.,* 2016). It is regarded as a veterinary emergency because without intervention, the cow is likely to die (Paul *et al.,* 2017). The prognosis will depend on the type of case, the duration of the condition before treatment, and severity of injury to the organ. Though, if the prolapse occurred as a sequel to a normal parturition and corrected within a few hours of its occurrence the prognosis is good (Umaru *et al.,* 2013).

The correction of a prolapsed uterus, usually involves, disinfection and washing the organ, reduction in size of the organ if edematous with glycerol, returning the organ back and applying stay sutures (Firdaus *et al.,* 2016). Early intervention and correction of cases of prolapsed uterine tissue is very vital in ensuring a good case prognosis and survival of the cow. Poor or delayed intervention may result in bleeding, contamination resulting in infection, shock, gangrene formation and death (Patil *et al.,* 2018). The present case report is aimed to describe the surgical repair of post-partum uterine prolapse in a two years old cross breed cow.

***Case history and clinical examination*:** The surgical management was conducted on a two years old primiparous cow on farm in Bishoftu town. The cow gave birth to large calf (Figure 12G) by manual traction two days before the case occured.

During clinical examination, the cow was weak, recumbent and the prolapsed uterine mass was edematous, contaminated with fecal material, and the necrotized fetal membrane was hanging on the uterus (Figures 12 A&B). The cow was apparently healthy and the physiological parameters were within the normal range.

***Pre-operative preparation*:** The cow was assisted to stand and driven to the down hill ground to assist the replacement of the prolapsed mass. The tail was tied to the side to prevent contamination and for easy manipulation of the prolapsed mass.

***Anesthesia and animal control*:** Caudal epidural block was achieved by injection of 2% lidocaine hydrochloride, @0.5mg/kg into the sacrococcygeal space for prevention of straining during

replacement of the prolapsed organ. The cow was controlled physicallyin standing position with the hind quarters elevated.

***Surgical procedure and technique*:** After allowing 10 minutes for the anesthetic to take an effect, sensitivity around the perineal region was assessed by pricking with a needle. The debris and dung materials were gently removed by washingthe prolapsed uterus with lukewarm water and chlorhexidine solution. The necrotic tissue was gently debrided (Figure 12C). The assistant holds the prolapsed mass upward and then with gloved and lubricated hands, the prolapsed uterus was gently pushed in step by step starting from the periphery of the mass using gentleforce. The right arm was inserted through the vagina to check the organ regain its normal anatomical position (Figure 12D). To prevent infection of the uterus, the fortified procaine penicillin (PPF) powder was applied into the uterine body. Then, two horizontal mattress retention sutures were applied on the base of the vulvar lips using non-absorbable suture material silk #1 to prevent recurrence (Figure 12E). The threaded gauze was applied in bilateral configuration to prevent injury to the vulvar tissue. The cow urinates immediately following correction (Figure 12F).


**Figure 12:** Repair of post-partum uterine prolapse in cow

A) A contaminated and edematous prolapsed uterus

B) A necrotized fetal membrane hanging on the uterus

C) Cleaning of the prolapsed uterus D) Replacement of the uterus to its position

E) Application of retention sutures F) Urination immediately following repair

***Post-operative care and outcome*:** After operation the cow was treated with Penstrep, 1ml/20kg, IM, SID for three days. Anti-pain Dexamethasone sodium phosphate injection, 0.1mg/kg, IM, SID was administered for three successive days. The retention suture was removed on the 7$^{th}$ post-operative day. The cow recovers successfully without any complications after the two weeks follow-up period.

**Discussion**

Among reproductive disorders in large animals, prolapse of reproductive organs occurs as a common gestational accident. The ruminants are predisposed to post-partum uterine prolapse due to the long myometrium contractions, violent straining, low plane of nutrition, hypocalcaemia, relaxed atonic flaccid uterus, lack of exercise and extreme laxity of perineum and vulvar lips (Ahuja *et al.*, 2016). The incidence of uterine prolapse is registered frequently in cattle and sheep (Makhdoomi *et al.*, 2014). It is generally noticed immediately post-partum especially after dystocia (Patil *et al.*, 2018). Similarly in the present case report, uterine prolapse occurred in cross breed cow two days post parturition to a large size calf.

Post-partum uterine prolapse is more common than the pre-partum prolapse mainly because of abrupt release of increased intra-abdominal pressure, uterine inertia and loss of muscular tonicity (Ahuja *et al.*, 2016). In the present case the underlying cause was evaluated to be dystocia from large size fetus and the low nutritional status of dam. The objective in the treatment of uterine prolapse was replacement of the organ to its original position and prevention of recurrence(Maruf *et al.*, 2014). This is in agreement with the present case management in which the organ was washed, reduced and retention suture was applied to prevent recurrence.

A full clinical examination of animals with uterine prolapse must be undertaken as signs of toxemia like in appetence, an increased respiratory rate, raised pulse and congested mucus membranes may be consisted with metritis. Vascular compromise, trauma and faecal contamination may also increase toxin intake across the uterine mucosa. However, careful

removal of these materials, after soaking with warm dilute antiseptic solution is usually successful (Senthil and Yasotha, 2015). This is in line with the current management method where the prolapsed mass was cleaned thoroughly with lukewarm water and dilute chlorhexidine solution by using gentle pressure.

A caudal epidural anesthesia is essential before replacement of a uterine prolapse as it decreases straining and desensitizes the perineum. The uterine prolapse can be replaced with the animal in standing or recumbent position (Umaru *et al.*, 2013). This is in agreement with the present case where caudal epidural anesthesia was achieved by injecting 2% lidocaine hydrochloride into the sacrococcygeal space and the prolapsed mass was replaced in standing cow. Elevation of hind quarters helps in repositioning of prolapsed uterus with good recovery rate. It was observed that the hygienic handling, proper management and treatment should definitely prevent further reproductive tract damage and aid in quick recovery (Samaddar and Haque, 2016).

An injectable broad spectrum antibiotics once administered for three to five days after replacement of the prolapsed mass will prevent secondary bacterial infection and the cow that were properly managed can conceive again without problems (Firdaus *et al.*, 2016). The usual sequel of uterine prolapse is hemorrhage, shock, septic metritis, peritonitis, infertility or death (Padheriya *et al.*, 2016). To sum up, in the present case management an effective correction of uterine prolapse was conducted in cow by application of horizontal mattress suture to prevent recurrence.

### *3.1.9. Penile amputation in cattle*

**Abstract**

Urethral obstruction is partial or complete blockage of the urethral lumen which often results in rupture of the bladder or extra-pelvic urethra in bovines. It occurs almost exclusively in the male ruminants compared to females due to their anatomical conformation of the urethral tract. The objective of the present case report is to describe the penile amputation conducted on three oxen under caudal epidural nerve block. A history of urine retention and abdominal discomfort was reported in all three cases. Per-rectal examination revealed a distended urinary bladder. On the basis of history and clinical examination, the case was diagnosed as urethral obstruction due to urethral rupture in the first two cases and from urethral calculi in the third case. The caudal

epidural nerve block was conducted by injection of 2% lidocaine hydrochloride into the sacrococcygeal space. Then the animal was controlled in lateral recumbency, the anterior perineum was prepared aseptically and penile amputation was conducted through the pre-scrotal incision. Post-operatively antibiotic and anti-inflammatory drugs were given for three successive days. Finally, the animals were recovered uneventfully and sold for slaughter.

**Keywords:** *bull, penile amputation, urethral calculi, urethral rupture*

## Introduction

The urethra in male ruminants is a long tube that extends from the bladder to the glans penis. It passes caudal on the floor of the pelvis, turns around the ischial arch, forming a sharp bend and passes cranial as a part of the penis, enclosed in the corpus cavernosum urethrae (Misk, Misk and Semieka, 2013). The male urethra consists of pelvic and extra-pelvic parts, connecting the urinary bladder to the penis (Ali *et al.*, 2020). Most common affections of the penile urethra includes congenital anomalies such as hypospadias in cattle, sheep, and goat; urethral dilatation in calves and goats; and acquired affections such as urethral obstruction and rupture in buffaloes, cattle and sheep (Ali *et al.*, 2020).

Urethral obstruction is partial or complete blockage of the urethral lumen which often results in rupture of the bladder or extra-pelvic urethra in bovines. It occurs almost exclusively in the male ruminants compared to females due to their anatomical conformation of the urethral tract (Mahajan *et al.*, 2017). Diagnosis of urethral obstruction depends mainly on case history and clinical presentation of animals. It is clinically characterized by complete retention of urine, frequent unsuccessful attempts to urinate and distension of the bladder (Marzok and El-Khodery, 2013). Lateral and ventro-dorsal radiography of the caudal abdomen and pelvic region and exploratory puncture would be performed for conformation of diagnosis (Kumar *et al.*, 2020).

Urethrostomy with penile amputation is the treatment of choice for urethral rupture and/or necrosis where repair of urethra is not possible (Kushwaha, Gupta and Dwivedi, 2021). Penile amputation helps in elimination of the most commonly affected segment of urethral tract, and thus prevents recurrence. In feedlot animals, this technique is used as a salvage procedure to utilize the meat; however, this procedure can also be used as a permanent treatment in working and other animals (Nair *et al.*, 2018). Penile amputation involves creation of a permanent perineal

urethrostomy from the proximal part of the transected penis (Sedeek and Bakr, 2009). Amputation of the penis is indicated following urethral rupture in steers, bulls, rams and bucks (Kalim, Zaman and Tiwari, 2011). One potential complication with this procedure is stenosis of the urethral opening in the penile stump (Makhdoomi and Gazi, 2013). The present case report is aimed to highlight the surgical management of urethral obstruction through penile amputation in three cattles.

**Case history and clinical examination**

**Case 1:** A six years old bullock weighing ~200kg was admitted to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of urine retention and reduced appetite since five days following fighting with other bull. The case was refered to VTH after unsuccessful medical treatment by local veterinarian. Clinical examination shows elevated body temperature, increased heart rate and respiration rate. The bullock was depressed, restless and frequently turns its head to the abdomen. Per-rectal examination revealed distended urinary bladder. Palpation of the penile tissue and the prepuce elicit a sense of pain.

**Case 2:** A five years old bull weighing ~200kg was brought to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of urine retention since 5 days following running after the cow for breeding. The problem was treated medically by local veterinarians and refered to VTH for surgical treatment. Up on clinical examination the prepucial cavity was swollen and painful (Figure 14A). Rectal examination reveals the urinary bladder was intact, but not distended.

**Case 3:** The case was conducted on two years old cross breed bull weighing ~200kg on farm in Bishoftu town. Urine retention since three days, reluctance to walk and reduced feed and water since two days was reported. The bull was managed intensively, feed on concentrate feed and wheat bran, but water was provided only once a day. During clinical examination the bull was depressed, reluctant to walk and urethral pulsation was prominent on the perineal area. Up on rectal examination the urinary bladder was highly distended.

Based on history and clinical examination the cases were diagnosed as urethral obstruction and penile amputation was decided to be conducted under local anesthesia.

***Pre-operative preparation*:** The animals were restrained mechanically in lateral recumbent position. Then the perineal area between the ischial arch and the posterior base of scrotum was prepared by washing with water and savlon, shaving with scalpel blade and scrubbing with povidone iodine for aseptic surgery.

***Anesthesia and animal control*:** Posteriorepidural block was achieved by injection of 2% lidocaine hydrochloride, @ 0.5mg/kg into the sacrococcygeal vertebral space. The animals were controlled mechanically in lateral recumbency with the upper two legs tied together with rope (Figure 13A).

***Surgical procedure and technique*:** About 10-12 cm long midline incision was made at the pre-scrotal perineal region. The incision was deepened through the subcutaneous and dense connective tissue between the semi-membranosus muscles until the paired retractor penis muscles and penis were identified (Figures 13B and 14B). The penis was then located, retracted caudodorsally and exteriorized. Then the retractor penis muscles were ligated and transected as far proximally as possible. The dorsal vessels of the penis were ligated proximal to the point of amputation (Figure 14C). Then using a scalpel blade the penis was transected 3 cm distal to the dorsal apex of the skin incision and the urethra was opened with scissor proximal to the incision apex (Figure 15A). Sterile plastic tube was fixed within the urethral opening to prevent stenosis during wound healing (Figure 14D). The proximal penile stump was fixed to the skin using PGA #2 by horizontal mattress suture surrounding and ligating the corpus cavernosum. The muscular layer and subcutaneous tissue incision above and below the penile stump was closed with simple interrupted suture pattern using PGA #2 and the skin incision was closed in simple interrupted pattern using silk #1. The patients were urinate immediately following surgery (Figures 13C and 14E). The transected distal urethra was dissected longitudinally and checked for the causes of blockage. Urethral rupture was seen in case 1 (Figure 13D) and case 2, whereas urethral calculi were recovered from the urethra in the third case (Figures 15B and C).


**Figure 13:** Penile amputation in bullock through pre-scrotal incision

A) Lateral restraint and pre-scrotal midline incision

B) Exteriorization of the penis

C) Dribbling of urine after completion of the procedure

D) Hematoma along the urethral length up on longitudinal incision


**Figure 14:** Penile amputation in bull through pre-scrotal incision

A) Swelling of ventral abdomen B) Skin incision at the sub-ischial perineum

C) Ligation of dorsal vessels of the penile tissue  D) Fixed proximal stump of the urethra
E) Urine dribbling immediately following surgery F) Full recovery of the bull during follow up


**Figure 15:** Penile amputation in cross breed bull through pre-scrotal incision

A) Proximal stump of the urethra after surgical operation
B) Lodgement of the calculi in the urethra distal to sigmoid flexure
C) A medium sized recovered urolith

***Post-operative care and outcome*:** Post-operatively broad spectrum antibiotic Penstrep, 1ml/20kg, IM, qd and anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.1mg/kg, IM, qd were administered for three successive days. The surgical wound was dressed with antiseptics for three consecutive days.  The skin sutures and plastic tube fixed to the urethral stump were removed on the 14$^{th}$ post-operative day. The animals were recovered without any complication after three weeks follow up period (Figure 14F). Finally, the animals were sold for slaughter.

**Discussion**

Urethral obstruction is partial or complete blockage of the urethral lumen that occurs almost exclusively in the male animals (Makhdoomi and Gazi, 2013). Urethral obstruction mostly occurred due to uroliths and trauma, especially in castrated male bovine (Eccles, Field and Officer, 2010). This is in complete agreement with the present case management in which urethral obstruction was occurred due to trauma to the penile tissue and from urethral calculi. If the urethral obstruction is complete, surgical treatment like urethrostomy, urethrotomy and penile amputation are necessary (Kalim, Zaman and Tiwari, 2011). This finding agrees with current case

report in which the urethra was completely obstructed in all the three cases and penile amputation was conducted as an immergency surgery.

Urethral obstruction in ruminants are managed by different surgical interventions such as cystic catheterization, bladder marsupialization, percutaneous tube cystotomy, penile transection with urethral fistulation and pelvic urethrotomy (Kumar *et al.*, 2016). Obstruction of urethra due to calculi or trauma results in retention of urine in urinary bladder and it's over distension. Failure to provide treatment at an early stage often leads to rupture of either urinary bladder or urethra ensuing in rapid deterioration of the condition of the animal (Sedeek and Bakr, 2009). Similarly in the present case management penile transection was conducted for managing the urethral obstruction which could relieve the animal and establish normal urine flow through artificially created opening. The bull had the history of running after a cow in heat and development of the urethral obstruction in case 1 of the present case management.

The authors (Kushwaha, Gupta and Dwivedi, 2021) has also reported a case of penile injury with urethral rupture during coitus in a bull. It was speculated that probably the penis was bent due to improper intromission or external injury from horn thrust resulting in rupture of the urethra and obstruction. The main benefit of penile amputation in such cases is to prevent undue force on anchored urethra and penis in post-scrotal region (Kumar *et al.*, 2016). Epidural anesthesia was achieved andthe penis was exteriorized through the prescrotal incision. Traction was applied to the penis in caudodorsal direction to free the distal penis from its attachments to the prepuce. The blood vessels on the dorsum of the penis were ligated immediately proximal to the proposed site of penile transection. The penis was then transected transversally and the distal penis was excised. The stump of the proximal penis was fixed to the skin in a caudoventral direction by a horizontal mattress suture. This procedure is in agreement with the technique used by the author (Mahajan *et al.*, 2017). In conclusion, the present case management suggests that penile amputation was effective surgical approach for cattle when urethral function can not be restored.

### *3.1.10. Surgical removal of cystic calculi in dog*

**Abstract**

Calculi are rock-like formations of minerals that develop in the urinary bladder and lodge in the urinary bladder or urethra. The objective of the present case report is to describe the surgical

removal of cystic calculi in a six years old, intact, small terrier male dog weighing 10kg that was brought to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of straining to urinate, dribbling of blood-tinged urine, urinary incontinence and loss of appetite since one week. The patient was severely dehydrated and a hard mass was palpated within the caudal abdomen. Ultrasonography of the caudal abdomen showed the presence of a hyperechoic mass with a clear acoustic shadow within the urinary bladder. Then cystotomy was conducted through the caudal midline incision under general anesthesia. A single large urolith that was circular in shape, white to light yellow in color, and weighing 54g was removed. The urinary bladder incision was closed by a double-layer inversional suture pattern without penetrating the mucosa using PGA #3-0. The abdominal incision was closed in three layers. Post operatively, antibiotics, analgesic, and fluid therapy were given for three consecutive days. However, the dog died on the fifth postoperative day from anorexia. A microscopic examination of the calculus revealed the presence of calcium phosphate crystals.

**Keywords:** *cystic calculi, cystotomy, dog, ultrasonography*

## Introduction

Urolithiasis is aggregates of crystalline and occasionally non crystalline solid substances that form in one or more locations within the urinary tract (Begum, Roshini and Bhuvaneshwari, 2019). Bladder stones (cystic calculi or cystoliths) are rock like formations of minerals that develop in the urinary bladder and lodge in the urinary bladder or urethra in dog (Uma *et al.*, 2018). When urine becomes oversaturated with lithogenic substances, uroliths may be formed and these can interfere with the complete and frequent voiding of urine (Ghorai, 2017). Increased urine salt concentration, decreased water intake, increased irreversible water losses, increased mineral excretion, urinary tract inflammation, change in urine pH are the major predisposing causes that may lead to the formation of calculi in the urinary tract (Uma *et al.*, 2018). There are different types of cystoliths in dogs which includes struvite, calcium oxalate, calcium carbonate, calcium phosphate, silica, uric acid, cystine and tyrosine crystals. The alkaline pH (pH>8.0) of urine favors the formation of phosphate, carbonate and struvite calculi, while acidic pH (pH<7.0) predisposes to urate and silicate calculi (Edwards, 2011).

Proper diagnosis of calculus in dogs provide key for the selection of the treatment regimen (Sharma *et al.*, 2020). Calculi are radiopaquewithin the urinary tract when detected

radiographically. Radiographic evaluation of urinary bladder was useful to detect the site, number, density and shape of calculi obstructing the urinary bladder (Kachwaha, 2016). Whereas, ultrasonography is used to evaluate the nature of the bladder and its contents. Calculi have mineral composition and thus visualized using ultrasound due to the formation of acoustic shadows distal to them (Westropp *et al.*, 2017). Calculi may be treated either medically or by surgical management. Medical management involves the dissolution of the crystals by affecting the mechanisms of crystallization. Surgical management is considered a more effective treatment of canine urolithiasis where the medical dissolution of calculus is not possible and it involves removal of the calculi by cystotomy or urethrostomy procedures (Ghorai, 2017). This case report is aimed to describe the surgical removal of cystic calculi in a small terrier dog.

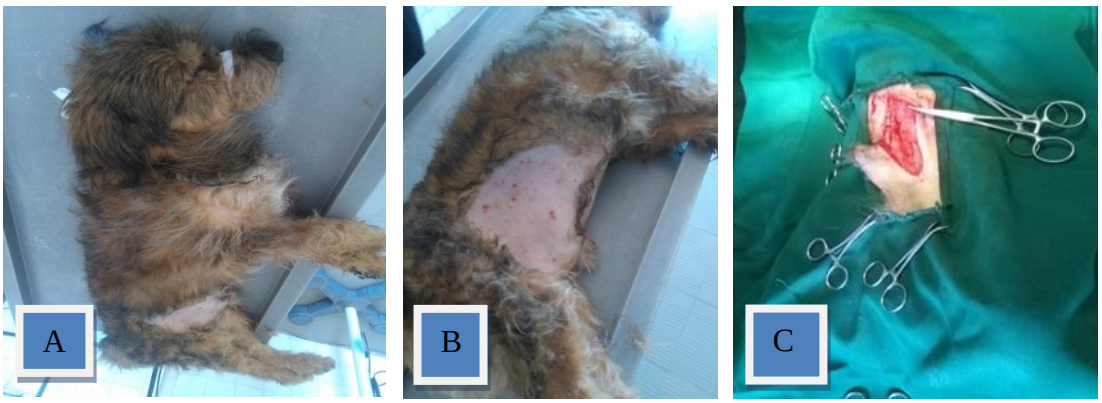
***Case history and clinical examination*:** A six years old small terrier dog weighing 10kg was brought to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of straining during urination, dribbling of blood tinged urine, and inappetance since a week. The dog was treated medically by local veterinarian and refered to VTH for better treatment.

During clinical examination the dog was dehydrated and weak (Figure 16A). Abdominal palpation reveals the presence of mobile hard mass within the caudal abdomen. For definitive diagnosis ultrasonography was carried out and revealed thickened urinary bladder with a circular hyper-echoic mass which cast a clear acoustic shadow inside the urinary bladder. Based on history, clinical examination and ultrasonography the case was diagnosed as cystic calculi and cystotomy was determined to be conducted under general anesthesia.

***Pre-operative preparation and ultrasonography*:** The body area from the costal arch to the pubis was prepared by shaving hair and clearing any dirt for ultrasonographic examination (Figure 16B). A coupling medium (gel) was applied over the probe to increase the skin transducer contact. The animals were restrained in dorsal, right or left lateral recumbency as per the requirement on a table. Ultrasonographic scanning was done and the amplitude of returning echoes (echogenicity) was visualized on two-dimensional, gray-scale images. Hyperechoic mass with acoustic shadowing in the urinary bladder was used as a definitive diagnosis of cystic calculus. After controlling the dog in dorsal recumbency caudal ventral midline was prepared for aseptic surgery. Then 18G IV catheter was secured to the cephalic vein and Dextrose 5% (D5W) solution, 500ml was infused during the procedure @ 10ml/kg/hr.

***Anesthesia and animal control*:** A preanesthetic was injected using ketamine @ 10mg/kg, IM. Then general anesthesia was induced using a combination of Diazepam @ 0.5mg/kg and Ketamine @ 5mg/kg BW through the cephalic vein. The same anesthetic protocol used for induction was used at the half dose for maintenance. The dog was restrained in dorsal recumbency on the surgical table.

***Surgical procedure and technique*:** A 5-6 cm long incision was made into the skin, subcutaneous tissue, linea alba and peritoneum on the caudal ventral midline (Figure 16C). Then the urinary bladder was exteriorized through the abdominal incision. The urinary bladder wall was thickened and the blood vessels on the serosal surface were engorged. As the urinary bladder was empty, the dorsal avascular surface of the urinary bladder was selected for cystotomy. The cystotomy was made with a stab incision (Figure 16D) and the incision was lengthened with mayo scissor to remove the cystolith. A single large calculus that measured 2.5 cm x 2.5 cm was removed from the bladder (Figure 16E). The calculus was circular in shape, white to light yellow in color, and weighing 54g. Retrograde flushing was conducted to clean the urethra and urinary bladder with normal saline solution. Cystotomy incision was closed by double layer inverting suture pattern without penetrating the mucosal layer using synthetic absorbable suture material PGA #3-0. The peritoneum and linea alba was sutured in simple interrupted suture pattern using PGA #2. Subcutaneous tissue was closed in simple continuous suture pattern using PGA #2-0 and skin incision was closed in subcuticular suture pattern using PGA size #2 (Figure 16F). Finally, the surgical area was disinfected with povidone iodine.



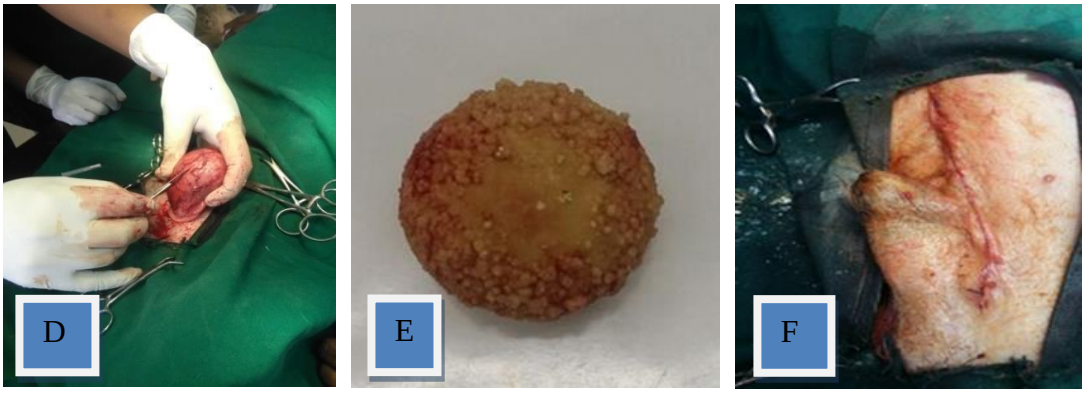



**Figure 16:** Surgical removal of cystic calculi in dog

A) A weak and dehydrated small terrier dog up on presentation
B) Preparation of both sides of abdominal area for ultrasonography
C) Ventral midline incision of the caudal abdomen
D) Incision into the urinary bladder on less vascular area
E) A single large calculus removed from the urinary bladder
F) Skin suture in subcuticular suture pattern

***Post-operative care and outcome*:** Post-operatively Penstrep, 1ml/10kg, IM, qd and Dexamethasone sodium phosphate injection, 1mg/kg, IM, SID were administered for three consecutive days. The surgical wound was dressed daily and fluid therapy was also continued for three successive days because the dog becomes anorexic. The owner was advised to shift the dog to low calcium and phosphorus diet. However, the dog was died on the $5^{th}$ post-operative day from urinary tract infection and anorexia. The calculus was taken to multipurpose laboratory for microscopic examination and confirmed as calcium phosphate crystals.

**Discussion**

The urinary system is designed to dispose of metabolic wastes in liquid form. However, sustained alterations in urine composition promote over saturation of one or more substances eliminated in the urine and result in their precipitation and subsequent growth during urolith formation (Ling *et al.*, 1998). Any congenital or acquired disorders leading to increased urinary excretion of certain minerals can predispose to urolith formation (Tion, Dvorska and Saganuwan, 2015). In dog urolith is most commonly found in lower urinary tract which includes bladder and urethra and it is

more common in adult intact male dogs (Begum, Roshini and Bhuvaneshwari, 2019). Similarly, in the present case the urolith was found in the bladder of six years old, un-castrated small terrier male dog.

Cystolithiasis occurs in 0.4-2% of the canine population and smaller dog breeds are more prone than larger breeds, and are more common in middle aged dogs (Ghorai, 2017). In the present case the dog came with the history of straining during urination, urinary incontinence, blood tinged urine and loss of appetite. This is in line with the reports of the author (Tion, Dvorska and Saganuwan, 2015) that states dogs with urolithiasis are presented with serious clinical conditions such as occult haematuria and partial or complete obstruction. Although haematuria is one of the most common clinical signs exhibited by dogs with urolithiasis, it can lead to wrong etiological diagnosis due to its multiple causes (Kell, Grant and Khan, 2017).

Definitive diagnosis of urolithiasis cannot be made on history, clinical signs, haematology, urinalysis and other findings except with diagnostic imaging. Therefore, for dogs with lower urinary tract signs, imaging is crucial when clinical signs persist or recur and some of the breeds are susceptible to urolithiasis (Fromsa and Saini, 2019). Similarly, in the current case definitive diagnosis was made using ultrasonography. Ultrasonography had a potential value in diagnosing urolithiasis. Microscopic examination of crystals in urine has diagnostic importance as different crystals have different appearance (Sharma *et al.*, 2020). In the present case, the calculus was single, large, and circular in shape. Similar physical characteristics has been described for phosphate uroliths in earlier reports of the authors (Uma *et al.*, 2018).

Struvite and oxalates are the most common canine cystoliths (Kell, Grant and Khan, 2017). Calcium phosphate uroliths are usually associated with metabolic disorders such as primary hyperparathyroidism, renal tubular acidosis and excessive calcium and phosphate diets (Tion, Dvorska and Saganuwan, 2015). Uroliths composed predominantly of urate or cystine occur infrequently in dogs and cats (Kell, Grant and Khan, 2017). This supports the current case in which the urolith is composed of calcium phosphate. In asymptomatic cases medical dissolution of urolith can be tried but in case of urethral obstruction surgical removal of calculi is the option. Post-operatively animal should be kept under dietary restriction based on the type of calculi (Sharma *et al.*, 2020). Generally, the evidence from this case reort suggests that cystotomy is the novel treatment approach for cystic calculi in dog once clinical manifestation occurs.

## 3.2. Surgery of the abdominal wall and organs

### *3.2.1. Repair of lateral abdominal hernia in stallion*


### Abstract

A hernia is a common surgical problem in different farm animals including horses that affects the productivity of the animals and should be diagnosed and treated early to minimize the risk of the problem and production loss. The present case report is aimed to describe the surgical management of lateral abdominal hernia in a stallion that was brought to the SPANA clinic with a history of swelling on the right side of the abdominal wall for a month. Up on clinical examination, the swelling was soft and non-reducible. Based on history and clinical examination it was concluded as lateral abdominal hernia and herniorrhaphy were conducted under general anesthesia. The Hernial ring was closed using sterile absorbable suture material PGA #2 in an overlapping mattress pattern. Subcutaneous tissue was closed by a simple continuous suture pattern using absorbable suture material and skin was closed by a simple interrupted suture pattern using non-absorbable suture material silk size #1. Antibiotic, anti-pain, and tetanus anti-toxin were administered post-operatively. The skin suture was removed on the 14th post-operative day. Finally, after one month regular follow-up period the horse was recovered successfully and admitted home.



**Keywords:** *herniorrhaphy, irreducible hernia, kick, stallion*


### Introduction

External hernia is the protrusion or displacement of an organ, part of an organ, or tissue outside the abdominal cavity through an abnormal opening in the abdominal wall which can be noted from the outside of an animal's body (Kelmer and Schumacher, 2016). Anatomically, hernia consists of three components that include hernial ring, hernial sac, and hernial content (Schumacher and Perkins, 2010). Hernia can be classified into different category depending on; the anatomical site of herniation, cause of hernia, type of the herniated tissue, nature of the reduction and it may be classified as external or internal hernia (Al Beteddini, Abdulla and Omari, 2016). External abdominal hernias involve defects of the abdominal wall (Al-Sobayil and Ahmed,

2007). Ventral or lateral abdominal hernia describes a hernia through any part of the abdominal wall other than a natural orifice (Earle *et al.*, 2016).

It is common in horse, goat and cattle besides acquired in nature where it is commonly seen along the costal arch, high or low in the flank, between the last few ribs or in the ventral abdominal wall near the midline (Thangadurai, Panneerselvam and Kathirvel, 2016). In animals ventral or lateral abdominal hernia occurs mainly due to any trauma such as a kick, blow, horn thrust or falling on blunt objects and rupture of pre pubic tendon (Sankar *et al.*, 2010). In horses, lateral abdominal hernia is usually the result of trauma, associated with facility problems where the animal is maintained and trauma caused by kicks from other animals (Amare and Haben, 2020). Ventral hernias in the horse may be classified according to etiology as traumatic abdominal wall ruptures, postoperative hernias and incisional hernias (Kelmer and Schumacher, 2016). They may be classified according to location; Iliac hernias occur above the stifle fold in the horse and are usually caused by a kick from another animal, Hypogastric hernias occur below the stifle fold and are generally caused by trauma from the shaft of a cart or the dividing bar between two stalls (Kummer, Stick and Fourth, 2012).

The primary diagnostic approach is made from the history and by palpation of the hernial region. In addition plain or contrast radiography and ultrasonography can be used in the diagnosis of hernia in farm animals. Further more, the diagnosis of the cases can also be confirmed by exploratory puncture of the swelling (Hassen, Bedu Kawo and Gondore, 2017). A hernia should be differentiated from abscess, tumor, and cyst that develop slowly whereas hernia is of sudden occurrence (Amare and Haben, 2020). There are several ways to treatment of hernia which depend on the size of hernial ring at the site. These includes reduction and retention by bandage, by application of blisters or injection of irritant solutions close to hernial ring after reducing hernia, by a ligature or by asset of through and through mattress sutures may be applied at the base of hernial sac and by radical operation (herniorrhaphy orhernioplasty) (Schumacher and Perkins, 2010). The present case report is aimed to describe the surgical repair of lateral abdominal hernia in horse.

***Case history and clinical examination*:** A five years old stallion weighing 182kg was brought to SPANA clinic with the history of swelling on the lateral abdominal wall (Figure 17A) which starts following kick from other horse a month before the admission date. The swelling starts early following kick, the feeding habit and body weight was reduced progressively.

Up on physical examination the swelling was soft and non-reducible. All the vital parameters were within the normal range (heart rate: 40 beat/min; respiratory rate: 16 breath/min; CRT: <2sec; Temprature: 37.9oC). Based on history and clinical examination it was diagnosed as irreducible lateral abdominal hernia and herniorrhaphy was determined to be conducted under general anesthesia.

***Pre-operative preparation*:** Feed and water was withheld for 6 hours. The horse was chemically and physically restrained. The surgical area was aseptically prepared by washing with water and savlon, shaving and scrubbing with povidone iodine (Figure 17C). The sterile drape was fixed on the abdominal area to prevent cross contamination. Then 18 gauge IV catheter was set through the jugular vein and 0.9% normal saline, 1000ml, was infused @ 10ml/kg/hr.

***Anesthesia and animal control*:** The stallion was premedicated with the combination of xylazine @1.1mg/kg and butorphanol @0.04mg/kg, IV. The general anesthesia was induced with ketamine @2.2mg/kg, IV. Anesthesia was maintained by continuous infusion of half dose of anesthetic used for induction. The horse was controlled in lateral recumbency with the affected side up ward (Figure 17B).

***Surgical procedure and technique*:** A sufficient vertical incision was made in the middle of the swelling (Figure 17D) and hernial sac was exposed (Figure 17E). Adhesion was removed by blunt dissection and the hernia is reduced by pushing the contents into the peritoneal cavity (Figure 17F). The border of the hernial ring was refreshed to facilitate the healing process. Then the ring was closed usingsynthetic absorbable suture material PGA #2 with multiple overlapping sutures (Figure 17G). The subcutaneous tissue was closed with simple continuous suture pattern using PGA #2 and the skin incision was closed by simple interrupted suture pattern using non-absorbable suture material silk size #1. Finally, the surgical site was dressed with a 1% povidone iodine solution and the horse was monitored until recovery from anesthesia.


**Figure 17:** Lateral abdominal hernia repair in stallion

A) The hernial swelling up on presentation B) Animal control in lateral recumbent position
C) Preparation of the surgical area D) Skin incision through the middle of the swelling
E) Removal of adhesion between hernial sac and abdominal wall
F) Replacement of the hernial content into the abdominal cavity
G) Herniorrhaphy by overlapping mattress pattern
H) Complete healing of the surgical area after one month

***Post-operative care and outcome*:** Post-operatively Penstrep, 1ml/20kg, IM, qd was administered for five successive days and NSAID Flunixin meglumine, 1.1mg/kg, IV, BID was given for two days. Tetanus anti-toxin (TAT), 5ml, IM, stat was also administered. The horse was kept on restricted feeding for one week. The surgical wound was dressed with antiseptics on every other day for seven days. Complications of abscess formation was seen at the surgical site during the first week and later managed by repeated treatment with penstrep for three days. Thenthe skin sutures were removed on the 14$^{th}$ post operation day. Finally, the horse was fully recovered after one month follow up period (Figure 17H) and admitted home.

**Discussion**

Lateral abdominal hernias are usually the result of blunt traumatic injuries from farm machinery, fence posts, or kicks from other horses (Kummer, Stick and Fourth, 2012). This statement was in agreement with the present case management in which lateral abdominal hernia occurred following kick from other horse. It is also in line with the findings of (Pavletic, 2005) which states that most traumatic hernias are the result of blunt trauma to the abdomen, including vehicular trauma, falls, or violent kicks.The size of hernia varies depending on the extent of the hernial defect and the amount of abdominal contents contained within it (Dey *et al.*, 2018).

In the present case the width of the hernial ring was <5cm and less volume intestinal loop was trapped within it.Hernias with large abdominal wall defects is relatively less of a threat to patients compared with those with smaller defects that are more likely to entrap variable portions of a visceral organ which leads to strangulation and necrosis (Pavletic, 2005). The most common locations for traumatic abdominal hernias are in front of the pubis, around the ribs, lateral abdomen, dorsal abdominal wall attachment to the transverse processes of the lumbar vertebrae, and the femoral triangle area (Hassen, Bedu Kawo and Gondore, 2017). This finding was in agreement with the present case in which the hernial swelling was found on the lateral abdominal wall.

Herniorrhaphy was conducted by overlapping suture technique to prevent recurrence and complications. This is in line with the findings of the authors (Dey *et al.*, 2018) which states that hernia can be treated in different ways among which herniorrhaphy is the most common of veterinary important, in which hernial ring approached together by incision over the sac or ring. Herniorrhaphy was commonly used in case of medium to large sized hernial ring and in case of

very large hernial ring hernioplasty was more effective (Venclauskas, Šilanskaite and Kiudelis, 2008). In the current case management absorbable suture material was used for the closure of the hernial ring and this was in agreement with the findings of the author (Al-Sobayil and Ahmed, 2007) which states that absorbable sutures can be used when the size of the hernial ring is no more than 4 fingers or if the hernia is less than 8 months old.

In the present case management there was adhesion of the hernial sac to the skin and abdominal wall which was corrected by blunt dissection. Similar finding was reported by the authors (Earle *et al.*, 2016). Similarly complications like adhesions and hydrocele of hernial sac, incarcerations and torsions were reported by the author (Vilar, Corbera and Spinella, 2011), and abscess was reported in the study of the author (Jettennavar, Kalmath and Anilkumar, 2010). Post-operative care of the patient minimizes the load on the surgical repair (Amare and Haben, 2020). Similarly in the present case management the horse was kept on restricted feeding for one week to reduce load on the surgical site and post-operative antibiotics was given to prevent wound infection. Generally, the current case report concludes that herniorrhaphy is aneffective approach for the management of small to medium size abdominal hernia.

*3.2.2. Repair of lateral abdominal hernia in calf*

**Abstract**

A hernia is a protrusion of the contents of a body cavity through a weak spot of the body wall. The objective of the present case report is to describe the surgical repair of a hernia in a two years old calf that presented to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH with a history of rapidly increasing swelling in the abdominal area since a month. Based on the history and clinical examination the case was diagnosed as a lateral abdominal hernia and herniorrhaphy were conducted under local anesthesia. Once the calf was controlled in lateral recumbency and the surgical area was prepared aseptically the skin over the swelling was opened, adhesion was removed, and the contents were reduced to the normal anatomical position. Then the edge of the hernial ring was refreshed and closed by multiple overlapping sutures using PGA #2. The subcutaneous tissue was closed in a simple continuous suture pattern using absorbable suture material PGA #2. Then the skin was closed in a horizontal mattress pattern using non-absorbable organic suture material silk #1. Antibiotic and anti-inflammatory drugs were administered for five consecutive post-operative days. The wound was

dressed every other day for 5 days. The skin suture was removed on the 14th day post-operatively. Finally, the calf had a successful recovery after three weeks follow-up period.

**Keywords:** *calf, herniorrhaphy, horn thrust, lateral abdominal hernia*

## Introduction

Hernia is a protrusion of the contents of a body cavity through a weak spot of the body wall (Kadapatti *et al.,* 2019). In cattle most common site of a hernia is the abdominal wall which acted as shield for the abdominal contents mainly the intestines (Farman, 2021). When any weakness extended in the abdominal wall, the ability of abdominal wall to be intact is lost and forms a hole, which is called as hernial ring, then the part of the abdominal viscera pass through the hole and appears as a bulge on the abdominal wall, which is visible on the skin as a hernia (Niwas, Arora and Mathew, 2018). Ventral or lateral abdominal hernia is herniation of contents through any part of abdominal wall other than a natural orifice (Dey *et al.,* 2018). In animals ventral hernia occurs due to any trauma such as a kick, blow, horn thrust or falling on blunt objects and rupture of pre pubic tendon (Amith, 2020).

A primary diagnosis of lateral abdominal hernia was made from the history and by palpation of the hernial region. However, confirmation is made by exploratory puncture of the swelling and demonstration of intestinal contents (Farman and Al-ameer, 2018). Ventral abdominal hernia is commonly found traumatic condition in ruminants (Sagar, Harish and Babu, 2010). There are several way to surgical treatment of hernia which depended on the size of hernial ring at the site. Primary repair (herniorraphy) is used for treatment of simple hernia complete with sutures sited in a straight line in the abdomen, and mesh repair (hernioplasty) is performed for repair of large and complex hernia by using networks and may be use a laparoscope (Kaswan, Purohit and Gahlot, 2014). Complex abdominal wall hernia treatment uses a mixture of primary and mesh repair (Kumar *et al.*, 2014).

The major complication of hernial repair is wound dehiscence and recurrence of the condition usually from tense suture application to approximate and close the defect (Niwas, Arora and Mathew, 2018). Despite improved surgical techniques, repair of these defects is a clinical challenge for veterinary surgeons. Literature on human surgery emphasizes the use of prosthetic materials for hernioplasty when the size of the hernial ring exceeds 3 cm in diameter (Karrouf *et*

*al.*, 2016). The objective of the present case report is to highlight a successful surgical management of lateral abdominal hernia in calf.

***Case history and clinical examination*:** A two years old local breed male calf weighing ~60kg was brought to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH with the history of rapidly increasing swelling on the right abdominal wall since a month following injury from horned bull. The calf had normal appetite and defecation.

During clinical examination a large, irreducible, soft swelling was found on the right lateral abdominal wall (Figure 18A). Exploratory aspiration reveals intestinal contents. The physiological parameters were within the normal clinical ranges. On the basis of history and clinical examination the case was diagnosed as irreducible lateral abdominal hernia and herniorrhaphy was decided to be conducted under local anesthesia.

***Pre-operative preparation*:** Feed and water was withheld for 12 hours prior to surgery. The liberal area of the swelling was prepared for aseptic surgery by washing, shaving and scrubbing with antiseptic solution. Sterile drape was fixed over the abdominal area with towel clamp.

***Anesthesia and animal control*:** Local anesthesia was achieved by linear infiltration of 2% lidocaine hydrochloride, 2mg/kg at the surgical area. The calf was controlled physically in left lateral recumbency with the upper hind limb stretched back ward and the three limbs tied together.

***Surgical procedure and technique*:** A sufficient skin incision was made on the middle of the swelling and hernial sac was exposed. The organs herniated were intestine and omentum. Adhesion between the hernial sac and the abdominal wall was removed by blunt dissection (Figure 18B) and the hernial contents were replaced into the abdominal cavity. The hernial ring was refreshed, overlapping sutures were applied (Figure 18C), and herniorrhaphy was conducted using PGA #2 (Figure18D). The subcutaneous tissue was sutured in a simple continuous suture pattern using PGA #2. Finally, the skin incision was closed in horizontal mattress suture pattern using non-absorbable organic suture material silk #1 (Figure 18E).


**Figure 18:** Surgical repair of lateral abdominal hernia in calf

A) Large herniated mass on the ventro-lateral abdomen
B) Adhesion between the hernial sac and abdominal wall
C) Application of overlapping stitches over the ring
D) Closure of the ring by herniorrhaphy
E) Closure of skin incision by horizontal mattress pattern
F) Completely healed calf after three weeks

***Post-operative care and outcome*:** After operation Penstrep, 1ml/10kg, IM, SID and anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.2mg/kg, IM, SID was administered for 5 successive days. The owner was advised to restrict feed for 1 week to minimize pressure on the surgical area. Regular antiseptic dressing of the surgical wound was carried out for 5 days. Skin suture was removed on 14$^{th}$ post-operation day and after three weeks regular follow up period the calf was recovered uneventfully (Figure 18F).

## Discussion

Abdominal wall is a very delicate part of the body of the animals and it is subjected to both trauma and clinical disorders (Karrouf *et al.*, 2016). Hernias are quite common in both young and mature animals (Amith, 2020). In the present case management a two years old calf was treated for lateral abdominal hernia from a horn thrust. Hernia may accrue by accident or due to normal anatomical opening, which does not completely fulfill its physiological function. So a part of an internal organ bulges through a weakened muscle, tissue, or membrane that would normally contain it (Farman, 2021). Any trauma caused by kick, horn thrust, violent contact with blunt objects or automobile accident or an abscess in the abdominal cavity may lead to weakening of the abdominal muscles that may lead to lateral or ventral abdominal hernia (Sagar, Harish and Babu, 2010). This is in line with the present case management in which lateral abdominal hernia was caused from horn thrust.

The most common locations for traumatic abdominal hernias are in front of pubis, around the ribs, lateral abdomen, dorsal abdominal wall attachment to the transverse process of the lumbar vertebrae and the femoral triangle area (Niwas, Arora and Mathew, 2018). In the case at hand herniation occurs on the lateral abdominal wall in front of the stifle joint. When hernia associated with blunt trauma, they are a result of rupture of the wall from within and caused by an increase in the intra-abdominal pressure while abdominal muscles are contracted (Kadapatti *et al.*, 2019). Hernias with large abdominal wall defects may cause less threat to the life of the patients compared with those with smaller defects that are more likely to cause incarceration, strangulation and may be death of the animal (Niwas, Arora and Mathew, 2018). In the current case management the hernial ring was medium size in diameter, and the contents were not incarcerated. However, there was large adhesion between the peritoneal sac and the abdominal wall.

Omentum and loop of small intestine were herniated through the ring in the present case. This was in line with the findings of the authors (Kumar *et al.*, 2014) that states the contents of the ventral hernia are usually omentum or part of gastrointestinal tract. The diagnosis of the hernia could be made through aspiration of contents of the hernia and palpation of hernial ring under the skin, but the diagnosis of irreducible hernias defaulted and needed to use the diagnostic aids to reflect the lack of abdominal wall continuity (Kadapatti *et al.*, 2019). Similarly in the current case diagnosis was made based on history of traumatic injury, palpation of the herniated contents and the hernial

ring, and aspiration of the contents. There are various treatment options for ventral abdominal hernia depending on the size of the hernial ring. Application of bandage, clamps or ligatures may be helpful in a few cases where the hernia ring is small. Surgical intervention is useful in case of large hernia opening (Kitessa, Merga and Afata, 2021). The most common complications of surgical hernia repair are hernia recurrence and wound infection (Karrouf *et al.*, 2016). In the present case however, the calf had uneventful recovery. To sum up, in the present case herniorrhaphy was successfully conducted to manage the traumatic lateral abdominal hernia in calf suggesting that this technique is effective for similar hernial cases.

*3.2.3. Rumenotomy in cow*

**Abstract**

Rumenotomy is commonly performed in cattle to relieve a variety of conditions affecting the fore stomachs. The present case report seeks to address the surgical management of rumen impaction in six years old cross breed cow conducted on-farm in Bishoftu town. Based on history and clinical examinations the case was diagnosed as rumen impaction and rumenotomy was conducted under local anesthesia. The cow was physically restrained and the surgical area was aseptically prepared, then local anesthesia was achieved by linear infiltration of 2% lidocaine hydrochloride. Through the lower flank laparotomy incision, the dorsal sac of the rumen was incised and a large volume of undigested poor quality roughage was removed. The rumen incision was closed by double-layer inversional suture patterns using PGA #2. Then laparotomy incision was closed in three layers; peritoneum and transverse abdominis muscle sutured by simple continuous suture pattern using PGA #2, two oblique muscles along with subcutaneous fascia in simple interrupted pattern using PGA #2, and lastly skin incision was closed by horizontal mattress suture pattern using silk #1. Post-operatively antibiotics and analgesics were administered for 5 consecutive days and the skin suture was removed on the 14th post-operation day. Finally, the cow recovers successfully after two weeks follow-up period.

**Keywords:** *cow, impaction, poor quality rouphage, rumenotomy*

## Introduction

Surgery of the rumen is commonly performed in cattle to relieve a variety of conditions affecting the fore stomachs (Lozier and Niehaus, 2016). Rumenotomy is indicated for many diseases in cattle, such as traumatic reticuloperitonitis, acute and recurrent bloat, ingestion of toxic plants, chemicals, spoiled roughage, placement of a temporary or permanent rumen cannula to relieve bloat, creation of a permanent rumen fistula, and impactions (Asrat and Melkamu, 2015). In addition ingestion of foreign bodies, such as baling twine, nylon ropes or plastic bags that are obstructing the reticulo-omasal orifice, foreign bodies lodged in the distal esophagus, and carbohydrate engorgement require surgical opening into the rumen and removal of the foreign materials (Miesner and Reppert, 2017).

Rumen impaction is among the most common cause of gastrointestinal disorders in ruminants.Poor quality roughage leads to ruminal impaction especially in animals with depraved appetite (Singh, Mahal and Kaur, 2020). Rumenotomy is encouraged for treatment of long standing cases of ruminal impaction which are unresponsive to conservative treatment (Akraiem and Abd Al-Galil., 2016). Rumenotomy is conducted usually through the left flank where the organ dominates. The procedure is a clean-contaminated surgery but effective and safest procedure for retrieving ingested foreign bodies as well as to resolve other conditions of the belly and its related structures (Lozier and Niehaus, 2016).

Peritonitis is thought to be a major complication associated with rumen surgery (Saidu *et al.*, 2020). Abdominal contaminations with rumen contents will likely lead to development of peritonitis. The severity of peritonitis is dependent on the extent of contamination, antimicrobial administration, and the health status of the animal (Singh, Mahal and Kaur, 2020). During rumenotomy rumen fixation can be performed by suturing the rumen to the skin, or using fixation devices, such as a Weingarth's ring (Dehghani and Ghadrdani, 1995). The technique of rumenotomy performed has also been associated with risk of development of peritonitis (Dehghani and Ghadrdani, 1995). Perioperative administration of antimicrobial drugs decreases the rate of infections after rumen surgery (Asrat and Melkamu, 2015). The current case report seeks to address the surgical management of rumen impaction in the cross breed cow.

***Case history and clinical examination*:** The six years old cross breed cow weighing ~300kg was reported to have ruminal tympany. The cow was recumbent since two weeks due to leg injury, her

belly gradually enlarged, and the appetite was reduced. The cow was managed intensively and fed on straw, corn bran, and hay at home.

Up on clinical examination the cow was dehydrated, weak, the stomach was distended on the left side, and the cow had breathing difficulty. Based on history and clinical examination the case was diagnosed as rumen impaction and rumenotomy was determined to be conducted under local anesthesia.

***Pre-operative preparation*:** The 18 gauge IV catheter was secured to the jugular vein andRingers lactate solution, 1000ml was infused @ 10ml/kg/hr. Fortified Procaine Penicillin, 4000,000 I.U, was injected intramuscularly to prevent infection. Then, the lower left flank was prepared for aseptic surgery by shaving and washing thoroughly with water and savlon. Finally, the area was scrubbed three times with a povidone-iodine 1% solution to decrease the microbial load and sterile drape was applied over the abdominal area (Figure 19B).

***Anesthesia and animal control*:** Local anesthesia was achieved with linear infiltration of 2% lidocaine hydrochloride, @ 0.5mg/kg to desensitize the surgical area (Figure 19A) and the cow was physically controlled in right lateral recumbency.

***Surgical procedure and technique*:** Approximately 20cm long vertical skin incision was made on the left lower flank region (Figure 19C). The incision was continued through subcutaneous fascia, external and internal abdominal oblique muscles, transverse abdominis muscle and peritoneum. Hemostasis was achieved by ligation and using hemostatic forceps. Then exploration of the abdominal cavity was conducted to check for adhesion and peritonitis. Then dorsal sac of the rumen was exposed to the surgical field and four stay sutures were placed to fix the rumen to the abdominal wall. The rumen was incised in vertical direction, exploration of the rumen and reticulum was conducted and one third of undigested poor quality roughage was removed from the rumen.Then, the edges of ruminal incision was cleaned and closed by double layer inversional suture pattern (cushing followed by lambert) using sterile absorbable suture material PGA #2 (Figure 19D) and the stay sutures were released. The peritoneum and transverse abdominis muscle was closed by simple continuous suture pattern using PGA #2 and abdominal oblique muscles and subcutaneous fascia was closed with simple interrupted suture pattern using PGA #2. Then skin incision was closed in horizontal mattress pattern using non absorbable suture material silk #1 (Figure 19E). Lastly, cyclo spray was applied to the surgical area.


**Figure 19:** Progression of rumenotomy in cross breed cow

A) Preparation of the surgical area and linear infiltration of local anesthetic
B) Fixation of sterile drape surrounding the surgical area
C) Exposure of dorsal sac of the rumen to the surgical incision
D) Closure of the rumen incision with inverting suture pattern
E) Skin suture with interrupted horizontal mattress

***Post-operative care and outcome*:** Postoperatively the cow was treated with Penstrep, 1ml/20kg, IM, qd for five days. Diclofenac sodium injection (75mg/3ml), 0.5mg/kg, IM, qd was also administered for three days to prevent inflammatory pain. Calcium borogluconate, 500ml was administered intravascularly. The owner was advised to provide soft feed for one week to reduce pressure on the surgical wound. The skin sutures were removed on the 14$^{th}$ post-operative day. Finally, the cow recovered successfully after three weeks follow up period.

**Discussion**

Rumen impaction is among the most common cause of gastrointestinal disorders in ruminants (Singh, Mahal and Kaur, 2020). This statement agrees with the current case management in which the cow ingests poor quality straw that leads to rumen impaction.Rumenotomy can be used for the diagnosis of intra-ruminal diseases other than those associated with foreign bodies (Dehghani and Ghadrdani, 1995). This finding is also in line with the present case in which rumenotomy was conducted to remove poor quality roughage.In the present case management undigested poor quality straw was removed from distended rumen to relieve respiration difficulty and enhance rumination.This is supported by the findings of the authors (Singh, Mahal and Kaur, 2020) that states rumen impaction results in enlargement of the rumen and arrest respiration.

In animals of ruminal impaction, the impacted mass was very dry and hard. The partially undigested feed was impacted highly forming layers. Once the ruminal explore is complete and 1/3 of undigested feed was removed, the ruminal incision is closed in 2 layers (Lozier and Niehaus, 2016). This technique is in line with the current case management in which ruminal incision is closed by double layer inversional suture pattern to prevent leakage of rumen content and the risk of peritonitis. Closure of the laparotomy incision should be done layer by layer and should avoid leaving any dead space, especially between muscle layers (Vermunt, 2011). This method was in agreement with the present case in which abdominal layers were closed in three layers. The cow was kept on a restricted diet for two weeks to reduce suture tension and prevent further complications. This is in agreement with the reports of the authors (Asrat and Melkamu, 2015) that states following rumenotomy animal was allowed to access liquid diet from the third day and easily digestible feeds from the fourth day onwards gradually. In conclusion, the current case report describes the successful surgical correction of rumen impaction in cow and conclude that rumenotomy is the effective method in relieving the various problems of fore stomachs in ruminants.

*3.2.4. Rumenotomy in sheep*

**Abstract**

The predisposition of small ruminants to indigestible foreign materials is becoming a major problem in the production systems of developing countries due to environmental pollution. The

objective of the present case report is to describe the surgical removal of the indigestible foreign materials from the rumen of a four years old free range ewe that was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of persistent unilateral abdominal distension, inappetence, and progressive weight loss. Ultrasonography was carried out and the compact mass was identified in the rumen. Based on history, clinical examination and ultrasonography the condition was diagnosed as indigestible foreign materials in the rumen and rumenotomy was conducted under local anesthesia. The animal was stabilized and the left flank was prepared for aseptic surgery. Rumenotomy was conducted through the left flank incision and a compact mass composed of sack thread and polythene plastic material weighing approximately 2kg was recovered. The ruminal incision was closed by double layer inversional suture pattern using absorbable suture material PGA #2 and the laparotomy incision was closed in three layers. Antibiotic and anti-pain was administered for three consecutive post-operative days. The surgical wound was dressed with antiseptics for three successive days and the skin suture was removed on the 14$^{th}$ post-operative day. There was a complication of small surgical site herniation. After three weeks follow up period the sheep had full recovery and gain weight.

**Keywords:** *ewe, foreign body, impaction, rumenotomy*

## Introduction

Under the traditional smallholder production systems feed scarcity is a major constraint to small ruminant production, in which animals mainly roam and seek their own feed (Mogoa, 2017). Roaming and scavenging for feed expose the animals to many health hazards including ingestion and accumulation of indigestible foreign materials in the rumen (Rabana *et al.*, 2022). According to different studies, the common non-piercing foreign bodies commonly ingested by ruminants are plastic bags, sack thread, ropes, leather, rubber, bed linen, pieces of lead pipe, straw baskets, hair and plant fibers (bezoars) (Amin and Fentahun, 2020). Indigestible rumen foreign bodies are reported to be a common cause of surgical emergency in veterinary medicine (Kuotsu, Kuotsu and Satbige, 2019).A number of factors have been concerned as risk factors for ingestion and accumulation of indigestible foreign materials in the rumen of sheep. These include starvation during long periods of feed scarcity (Igbokwe, Kolo and Egwu, 2003), mineral and nutritional deficiencies (Sheferaw, Gebru and Asrat, 2014), depraved appetite and increased environmental

pollution with non-biodegradable materials, which prevail in the developing world (Kuotsu, Kuotsu and Satbige, 2019).

Over 80 percent of the energy supply for sheep is obtained through fermentation of feed materials in the rumen (Martin *et al.*, 2021). When the process of fermentation and absorption of volatile fatty acids is interfered as a result of accumulation of indigestible foreign bodies in the rumen, the animal is deprived of valuable nutrients for its survival (Igbokwe, Kolo and Egwu, 2003). Indigestible foreign body impaction of the rumen of small ruminants could manifest different clinical signs which vary widely from mild indigestion to life threatening systemic signs (Mogoa, 2017). It is typically asymptomatic,but may cause wasting or progressive emaciation in the affected animals during terminal stages. These animals may also display clinical symptoms with severe impact and damage due to sharp object perforation (Rabana *et al.*, 2022).

Diagnosis of foreign body impaction in small ruminants is usually based on abdominal palpation, and in most cases, it can be difficult to distinguish between pregnancy and foreign body impaction. Certain methods of diagnosis necessitate radiography and ultrasonography (Otsyina *et al.*, 2017). Although most of the diseases affecting the gastrointestinal tract in ruminants are managed medically, some require surgical intervention (Asrat, Melkamu and Nazir, 2015). The current case report is aimed to describe the surgical management of rumen impaction due to indigestible foreign bodies in sheep.

***Case history and clinical examination*:** A four years old free range ewe was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of persistent unilateral abdominal distension, inappetence, and progressive weight loss. The owner added that the sheep was managed extensively in Bishoftu town and gives birth to twins three days before the admission date.

During physical examination the sheep was dehydrated, emaciated and the abdomen was distended on the left side. Abdominal palpation reveals the presence of hard mass and ultrasonography was carried out for definitive diagnosis. The ultrasound image shows the presence of compact mass within the rumen. Based on history, clinical signs and ultrasonography the case was diagnosed as indigestible foreign body and rumenotomy was decided to be conducted under local anesthesia.

***Pre-operative preparation*:** The liberal area of left paralumbar fossa was prepared for aseptic surgery by washing, shaving and scrubbing with povidone iodine (Figure 20A). 18 gauge IV catheter was secured at the jugular vein and Normal Saline (0.9% NaCl) solution, 500ml, was infused during the surgical procedure @ 10ml/kg/hr.

***Anesthesia and animal control*:** The sheep was physically controlled in right lateral recumbency on the surgical table by securing the four legs to the table. The local anesthesia was achieved by infiltrating 2% lidocaine hydrochloride @ 0.5mg/kg into the surgical area in inverted L technique.


**Figure 20:** Rumenotomy for the removal of foreign body in sheep

A) Animal control and aseptic preparation of the surgical area
B) Laparotomy incision at the left paralumbar fossa
C) Ruminal incision on the dorsal sac
D) The recovered indigestible foreign body
E) Closure of the rumen wall incision in double layer
F) Skin closure in horizontal mattress technique
G) Completely recovered sheep after two weeks

***Surgical procedure and technique*:** Approximately 10cm vertical incision was made into the skin, subcutaneous tissue, abdominal muscles and peritoneum at the middle of the left paralumbar fossa (Figure 20B). Then exploration of the abdominal cavity was conducted to check for adhesion or any abnormality. The dorsal sac of the rumen was exteriorized through the incision and fixed to the skin by four retention sutures. The less vascular area of the ruminal wall was incised (Figure 20C) and the content was explored by palpation of the rumen contents. Then the strangulated indigested roughage, plastic material and thread weighing around 2 kg were recovered from the interior of rumen (Figure 20D). The edge of the ruminal incision was cleaned and closed in double layer inversional suture pattern, cushing followed by lambert using PGA #2 (Figure 20E). The suture was checked for leakage, then the stay sutures were released and the rumen was repositioned into the abdominal cavity. The abdominal cavity was lavaged with normal saline. The laparotomy incision was closed in three layers. Peritoneum and transverse abdominis muscle was sutured in simple continuous suture pattern using chromic catgut #2. The abdominal oblique muscles along with subcutaneous fascia was closed in simple interrupted pattern using PGA #2 and the skin incision was closed in horizontal mattress pattern using non absorbable suture material silk #1 (Figure 20F). Finally, the surgical area was disinfected with povidone iodine and the sheep was admitted home.

***Post-operative care and outcome*:** Following surgery broad-spectrum antibiotic Penstrep, 1ml/10kg, IM, SID and anti-pain Diclofenac sodium injection (75mg/3ml), 2mg/kg, IM, SID were administered for three consecutive days. The surgical wound was dressed with antiseptics regularly for three days and the skin suture was removed on the $14^{th}$ post-operative day. There was a complication of small herniation at the surgical site (arrow). Finally, the sheep was fully recovered and the body condition was improved after the three weeks follow up period (Figure 20G).

**Discussion**

Ingestion of foreign body is one of the major bottle necks to livestock development in the developing countries (Olusola, Mayokun and Olugbenga, 2019). In Ethiopia, ruminants are kept under an extensive type of management and are likely to be exposed to the ingestion of indigestible garbage from various sources. This is due to a wide spread environmental pollution with plastic bags, absence of policy to protect environment and frequent occurrence of drought that predispose animals to nutritional deficiency and pica (Amin and Fentahun, 2020). Similarly in the current case the sheep was managed extensively in the town and no supplement was provided by the owner which may lead to mineral deficiency. In urban areas, the grazing areas are not available and animals search for food at non feeding places which may lead to mineral deficiency. In pica or free range system of rearing, sheep and goats consume indigestible foreign materials(Kuotsu, Kuotsu and Satbige, 2019). Small ruminants are highly selective feeders and ingest significantly less amount of foreign bodies as compared to cattle. However, the ingestion of indigestible materials may occur during period of feed scarcity (Igbokwe, Kolo and Egwu, 2003). It is possible that sheep and goats may ingest foreign bodies because of shortage of feeds and forage.

In some instances however, especially in urban areas, plastic bags containing food debris are thrown besides the road, and while sheep and goats are searching for food in them, the bags are eaten as well (Fasil, 2016). This finding supports the present case management in which the sheep was managed extensively and searchs for feed inside the town.Clinical presentation of indigestible foreign body in sheep was characterized by emaciation, abdominal distension, asymmetry, lack of faeces in the rumen, foamy salivation, recumbency and inappetence (Olusola, Mayokun and Olugbenga, 2019). This is in line with the clinical presentation of the current case in which the sheep was emaciated, the abdomen was unilaterally distended and inappetence was also reported.

The accumulation of indigestible material can lead to the generation of a hard mass in the rumen which could cause impaction, the accumulation of gas, and even death. Under these circumstances, rumenotomy is indicated (Martin *et al.*, 2021). It reduces the absorption of VFAs and consequently reduces the productivity of the animal and therefore has a great economic impact (Rabana *et al.*, 2022). The most common complications of rumen surgery include abscesses at the incision site and peritonitis (Mogoa, 2017). Similarly in the current case surgical site herniation was occurred post operatively. Generally the present case report describes the

successful surgical removal of non-metal indigestible foreign materials from the rumen of the four years old free range sheep.

*3.2.5. Management of rumen evisceration in sheep*

**Abstract**

Abdominal evisceration is herniation of the contents of the peritoneal cavity through the body wall with exposure of the abdominal viscera. The present case report aimed to address the surgical correction of abdominal organ evisceration in a four years old ewe that presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of dog bite 6 hours before admission. During clinical examination, the eviscerated organ was rumen and loop of the small intestine that was lacerated, hyperaemic, and contaminated with small perforation and leakage of the rumen contents. Immediate stabilization and surgical intervention were carried out to save the life of the animal. A ewe was restrained mechanically in dorsal recumbency to assist the return of the large eviscerated ruminal mass. The exposed part of the abdominal organ was thoroughly cleaned with a mild antiseptic solution and normal saline. The perforated area of the rumen was sutured. The damaged area of the skin was aseptically prepared and the opening was advanced on both ends to allow safe replacement of the eviscerated organ. Then the eviscerated organ was reduced and repositioned into the normal anatomical position. The abdominal wall was closed in three layers. Post-operatively antibiotics and anti-pain were administered. However, the sheep died a few hours after surgical management from shock.

**Keywords:** *dog bite, ewe, rumen evisceration, shock*

**Introduction**

Abdominal evisceration is defined as herniation of the contents of the peritoneal cavity through the body wall with exposure of the abdominal viscera (mainly intestines) (Prakash *et al.*, 2014). Abdominal evisceration injuries can be devastating, but trauma to the small intestine is uncommon (Gower, Weisse and Brown, 2009). Intestinal and mesenteric injury occurs commonly with penetrating abdominal wounds and blunt abdominal trauma or may occur with bite wounds of the abdomen (Bhuyan *et al.*, 2016). Most cases of intestinal evisceration in animals often occur

following wound dehiscence (incisional hernias) or accidental wounds on the abdominal wall. However, in some instances, it results from traumatic accidents or dog bites (Bhuyan *et al.*, 2016).

The protruded organ normally becomes very congested and necrotised during the evisceration. The exposed tissue rapidly becomes oedematous and inflammed and is easily traumatized (Prakash *et al.*, 2014). Regardless of the inciting cause, exposure and contamination of the abdominal viscera requires immediate surgical intervention (Brennan, 2017). Principles of preoperative treatment include hemodynamic stabilization, antimicrobial treatment, extension of the abdominal rent to prevent vascular compromise of eviscerated organs, and application of a sterile dressing until surgical intervention (Sethi *et al.*, 2017).

Surgical principles include assessment of organ viability; cleansing, repair, and reduction of eviscerated organs; exploration of other intra-abdominal organs; lavaging of the peritoneal cavity with copious amounts of fluids; and debridement of wound edges prior to closure when they appear nonviable or infected (Singh, Young and McNaught, 2017). Where possible, and if tissues are viable, wound closure should be attempted unless there is too much tension or tissue loss. The timing for wound closure should be decided on a case-by-case basis and, in some instances, when there is significant swelling, it may be preferable to delay wound closure for a period of one to two days (delayed primary closure) (Singh, Young and McNaught, 2017). When closing wounds, careful attention should be paid to dead space and drainage of potential wound exudate (Brennan, 2017). The present case report is aimed to address the surgical management of abdominal organ evisceration from dog bite in sheep.

***Case history and clinical examination*:** A four years old ewe was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of dog bite 6 hours before admission.

Up on clinical examination there was violent injury to the skin, muscle and peritoneum of the left caudo-ventral abdomen besides large volume of the rumen and small parts of intestinal loops were eviscerated (Figure 21A). The eviscerated organ was lacerated,congested and contaminated. There is small perforation and leakage of the contents on the rumen. The intestinal loops were not damaged except for minor contamination with debris. Respiration and pulse rates were slightly elevated with declined rectal temperature.

***Pre-operative preparation*:** The sheep was controlled in dorsal recumbency and IV catheter was secured on the jugular vein and Normal saline (0.9% NaCl) solution, 500ml, was infused during the surgery @ 10ml/kg/hr. Then the eviscerated part of the abdominal organ was thoroughly cleaned with mild antiseptic solution and normal saline. The surrounding area of the skin was prepared aseptically by shaving, washing and disinfection (Figure 21B).

***Anesthesia and animal control*:** The sheep was restrained physically in dorsal recumbency to assist the return of the large eviscerated ruminal mass. 2% lidocaine hydrochloride, @ 5mg/kg was infiltrated into the surgical area in circular manner to provide local anesthesia.

***Surgical procedure and technique*:** The skin wound was extended longitudinally to allow the safe replacement of the eviscerated organ into the abdominal cavity. The mass was examined thoroughly for any perforation, contamination and viability. Small perforation on the dorsal sac of the rumen was sutured using chromic catgut size 3-0 in inverting pattern. Then the mass was reduced gently and repositioned into the peritoneal cavity (Figure 21B), the cavity was lavaged with normal saline solution. Procaine penicillin powder was applied to the peritoneal cavity to prevent peritonitis. Then the abdominal wound was closed in three layers. Peritoneum and transverse abdominis muscle was sutured in simple continuous suture pattern using PGA #2 (Figure 21C). The external sheath of the rectus abdominis muscle and subcutaneous fascia was closed in simple interrupted suture pattern using PGA # 2. The skin incision was sutured in simple interrupted pattern using non-absorbable suture material silk (Figure 21D). Finally, the surgical area was scrubbed with povidone iodine.

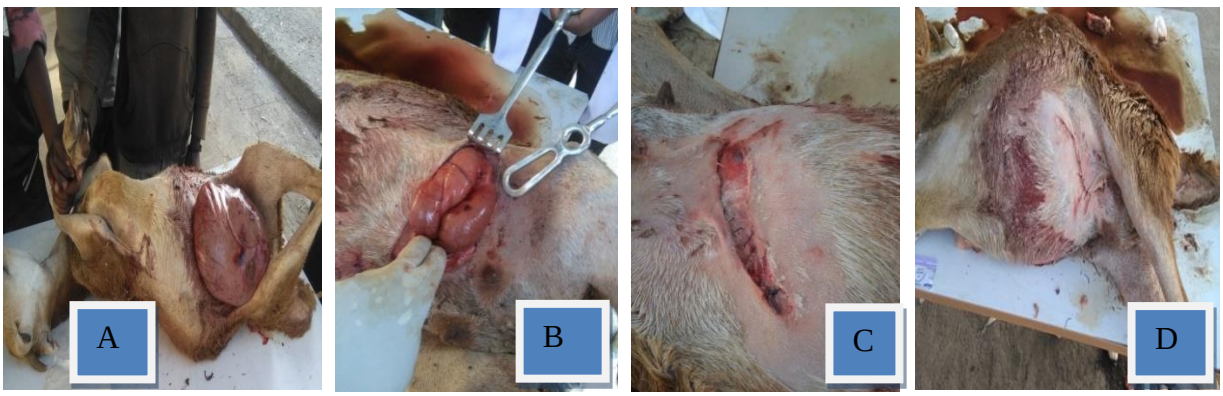



**Figure 21:** Surgical correction of rumen evisceration in sheep

A) Eviscerated rumen and some parts of intestinal loops up on presentation

B) Aseptic preparation, reduction and repositioning of the organs
C) Suturing of the abdominal wall layer by layer
D) Closure of the skin and disinfection of the area

***Post-operative care and outcome*:** Post surgery broad spectrum antibiotic Penstrep, 1ml/10kg, IM and anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.2mg/kg, IM were administered. However, an ewe was died few hours after surgery. The main cause of death is supposed to be from shock.

**Discussion**

Major abdominal evisceration was defined as herniation of most of the abdominal contents through the body wall (Gower, Weisse and Brown, 2009). In the current case most parts of the ruminal wall and some parts of intestinal loops were eviscerated and contaminated. The animal was died from hypothermia and respiratory arrest. This was in line with the reports of the authors (Bhuyan *et al.*, 2016) that states prognosis of evisceration depends on severity of trauma, location, body organ exposed, bleeding, contamination, stabilization, strangulation, administration of antibiotics and early surgical intervention and post-operative care.

Exposed organ may quickly get contaminated and may result in to shock stage from fluid and blood loss. Early stabilization and surgical intervention can increase the survivability of the animals with less or no post-operative morbidity (Gower, Weisse and Brown, 2009). In the case at hand the patient was not admitted early and the organs were exposed to environmental temperature for about six hours. The decision of closing the abdominal wall and superficial tissue depends on the amount and location of tissue damage and wound contamination. Primary repair should be appropriate for those animals with acute evisceration (Prakash *et al.*, 2014).

Since the animal had minimal intra peritoneal but significant superficial tissue damage, routine abdominal wall closure was done in present case. Deep severely contaminated wounds should best managed by open peritoneal drainage techniques (Mccarthy, Lux and Seibert, 2016). Usually the dog bite wound could not be closed completely but in this case considering the viability of the eviscerated mass and even wound margin, the skin was closed completely to prevent further contamination and infection. This is in complete agreement with the reports of the authors (Prakash *et al.*, 2014). In conclusion, the evidence from this case management suggests that the

case of abdominal organ evisceration from bite wound has grave prognosis if not treated early and if the damage to eviscerated organ is severe.

### 3.3. Extirpation of Eye in Ox


#### Abstract

Extirpation is one of the most common orbital surgical procedures performed in cattle. The objective of this case report is to describe the extirpation of the eye in a 5-year-old ox that presented to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH with a history of the unilateral loss of sight for three weeks. On clinical examination, the injured eye was warm and had decreased visual acuity, but the lids were closed. On the basis of history and clinical examination, the case was diagnosed as irreparable injury to the eye and decided to remove the eye by transpalpebral extirpation. After proper restraint of an ox, the peripheral part of the affected eye was shaved and washed with an antiseptic solution. A Peterson nerve block was performed with 2% lidocaine hydrochloride. Temporary tarsorrhaphy was applied to the eyelids and extirpation of the contents of the globe was conducted through the transpalpebral incision. After removing the eye, sterile gauze impregnated with the antiseptic solution was plugged into the eyeball socket and the eyelids were closed by a ford interlocking suture pattern using silk #1 by leaving space at the medial canthus for removal and change of the gauze plug. Postoperatively an antibiotic and anti-pain were administered for five consecutive days. After one month follow-up period the animal was recovered successfully and managed intensively for the feedlot.



**Keywords:** *cattle, eye extirpation, tarsorrhaphy, transpalpebral incision*


#### Introduction

Extirpation is one of the most common orbital surgical procedures performed in cattle (Vermunt and Vermunt, 2011). It involves the removal of globe, muscle, and adipose tissue (Potter, 2007). It alleviates painful ophthalmic pathologies and can halt the progression of neoplasias such as ocular squamous cell carcinoma (Schulz and Anderson, 2010). It is also indicated for chronic endophthalmitis or panophthalmitis leading to blindness in the affected eye, chronic glaucoma leading to buphthalmia and associated retinal and optic nerve damage, intraocular neoplasms

where intraocular surgery is not feasible, trauma or proptosis of the globe leading to irreversible damage of the eye and intraocular contents (Townsend and Acvo, 2013).

Two approaches for removal of the eye have been described as transpalpebral and subconjunctival approach. The former involves dissection of the extraocular muscles without penetration of the conjunctival sac (Anderson and Muir, 2005). Removal of the eyesin cattle can also performed by extirpation or exenteration,and unlike enucleation it involvesthe aggressive debridement of the paraorbital structures in extensive or infiltrative ocular diseases such asneoplasia, usually squamous cell carcinoma (Helbig and Iseli, 2002). It involves the removal of everything within the orbit: globe, muscle, adipose tissue and the lacrimal gland. In cases of ocular neoplasm, surgery is not indicated when there is involvement of the bony orbit or when there is evidence of metastatic spread (Potter, 2007).

Enucleation or extirpation is frequently performed in the standing animal under local anesthetic; but requires proper restraint (Townsend and Acvo, 2013). In addition,use of sedatives like xylazine is useful, especially in fractious patients, although care should be taken with the dose rates to avoid the animal going down during the procedure. Besides, analgesics and a broad-spectrum antibiotic should be administered (Shaw-edwards, 2010). The two potential methods of local anesthesia for enucleation or extirpationincludes the retrobulbar block and the Peterson block (Pearce and Kerr, 2006). The four-point retrobulbar block is performed by injecting through the eyelids, both dorsally and ventrally (at the 6 and 12 o'clock positions) and at the lateral and medial canthi. Immobilization of the globe and anesthesia of the eye and orbit are commonly achieved with the Peterson eye block technique (Skarda, 1996).

There are several complications associated with local anesthesia for eye enucleation (Potter, 2007). Retrobulbar anesthesia has been associated with orbital haemorrhage, penetration of the globe, optic nerve injury, and acute death following injection into the optic nerve meninges. Accidental injection of anesthetic into the ethmoid turbinates has been observed during performance of the Peterson nerveblock (Pearce and Kerr, 2006). Complications associated with enucleation in animals include rupture of the globe during surgical manipulation with subsequent contamination of the surgical site, excessive orbital haemorrhage, excessive trauma to the remaining tissue leading to swelling or haemorrhage, discharge from the excision site due to an orbital infection, retained lacrimal duct or nictitans tissue, and periorbital cellulitis (Ali, Sadan

and Ibrahim, 2015). The current case report is aimed to describe eye enucleation by transpalpebral incision approach in cattle.

***Case history and clinical examination*:** A five years old local breed ox was presented to Addis Ababa University College of Veterinary Medicine And Agriculture Feseha Gebre Ab VTH with the history of loss of unilateral sight. The owner reported that the ox get hit to the right eye before three weeks and manifested excessive lacrimation, progressive loss of vision and body weight.

Up on clinical examination the affected eye was hot, highly swollen and painful, purulent discharge oozes from the damaged eye (Figure 22A). Temperature, pulse and respiratory rate are within normal range. Depending on the history and clinical examination the case was diagnosed as irreparable injury to the eye ball and admitted for removal of globe by enucleation under local anesthesia.

***Pre-operative preparation*:** The ox was physically restrained in lateral recumbence and the liberal area around the affected eye was prepared for aseptic surgery by washing, shaving and scrubbing with dilute antiseptic solution (Figure 22C).

***Anesthesia and animal control*:** A Peterson nerve block was achieved by injection of2% lidocaine hydrochloride @1mg/kg into the orbitorotundum foramen (Figure 22B). Then an ox was restrained in lateral recumbent position with the affected side upward.

***Surgical procedure and technique*:** The eyelids are sutured using a simple continuous pattern by leaving a long suture at the two ends (temporary tarsorrhaphy). An elliptical incision was made into the skin about 1 cm away from the margins of the eyelid. The incision was continued through the subcutaneous tissue and down to the orbital muscles. Care was taken to avoid incision into the conjunctiva, as the conjunctival sac is a source of potential contamination for the surgical field. Blunt dissection is continued for 360º around the orbit, until the eyeball and conjunctival sac is loosened from its muscular attachment. Once the eyeball is freed from its muscular attachments the optic stalk and associated blood vessels were clamped with a curved forceps and transected above the forceps with curved blunt scissors (Figure 22D). Since the contents of the orbit arenot healthy adipose tissue, the lacrimal gland, fascia and all muscles wereremoved along with the ruptured eyeball contents. The orbit was packed with sterile gauze sponge soaked in iodinetincture to achieve hemostasis by mechanical pressure. Then the eye lids were closed by

interlocking suture pattern using silk size # 1 by leaving space at the medial canthus to change the gauze pack during post-operative care (Figure 22E). Finally, antibiotic cyclo-spray was applied to the surgical area.


**Figure 22:** Progression of eye extirpation in ox

A) Loss of vision from the right eye up on presentation
B) Peterson nerve block technique
C) Aseptic preparation of the periorbital area
D) Removal of the eye ball and associated muscles
E) Closure of the incision site with interlocking suture pattern
F) Completely recovered animal after two weeks

***Post-operative care and outcome*:** Postoperatively Penstrep, @1ml/20kg, IM, SID and Dexamethasone sodium injection, @0.1mg/kg, 5ml, IM, SID were administered for five consecutive days. The packed gauze was changed on every other day for three days. Upon regular follow-up the purulent discharge was seen for a week from the eye socket following surgery. Then treatment was repeated with Oxytetracycline (20%), @20mg/kg, IM, stat. Then the surgical

wound was healed and suture material was removed on the 14th day postoperation. Finally, an ox was recovered successfully after two weeks regular follow up period (Figure 22F).

**Discussion**

The ruminant eye may be afflicted by several diseases requiring surgical intervention. For instance, severe unresponsive cases of infectious bovine keratoconjunctivitis, bovine ocular squamous cell carcinoma, and trauma (Welker, 1995). The current surgical procedure was conducted due to mechanical trauma to the right eye ball. Extirpation is the removal of all the contents of the orbit (Shaw-edwards, 2010). Because the cosmetic appearance is not as important in cattle as in some other animals and this technique is simple and fast, it is the most commonly used procedure when there is severe damage to the globe (Ali, Sadan and Ibrahim, 2015). Similarly extirpation was conducted in the current case management because the contents of the orbit are not healthy and eye ball was ruptured.

In the present case report Peterson nerve block was applied because of ease of application and less anesthetic requirement. This is in agreement with the technique used by the author (Anderson and Muir, 2005). Following surgical preparation, the lids are sutured together to minimize contamination and a trans-palpebral elliptical incision is made 1 cm from the lid margins. Similar procedure was described by the author (Welker, 1995). Once the plane between the skin and conjunctiva was located, dissection is continued 360 degrees around the globe, down to the bony orbit and all ocular muscles are dissected blindly using blunt-blunt curved scissors. This is in line with the procedure stated by the author (Sharma, Sharma and Kumar, 2012).

A significant bleeder often is seen at the medial canthus of the bony orbit and must be clamped or ligated (Ali, Sadan and Ibrahim, 2015). Bleeding from the optic artery can be considerable and the operator may choose to ligate or clamp and ligate prior to severance of this structure (Helbig and Iseli, 2002). In the present case management the optic artery was clamped and severed, hemostasis was achieved by mechanical pressure using sterile gauze tamponade. The eye lid was sutured with silk using horizontal mattress pattern leaving an opening near medial canthus for drainage of exudates and daily insertion of antiseptic impregnated gauze (Anderson and Muir, 2005).

Similarly, in the current case management ford interlocking suture pattern was applied using non absorbable suture material. Where non-absorbable sutures are used to close the skin these should be removed and the area re-examined 10 to 14 days after suture, or sooner if complications occur (Shaw-edwards, 2010). The packed gauze was changed on every other day for three days in the current case. Generally, the trans-palpebral eye extirpation performed in the current case management is an effective approachfor the removal of ruptured eyeball in cattles.

### 3.4. Surgical Management of Aural Hematoma in Dog


**Abstract**

The aural hematoma is the accumulation of blood or serum within the cartilage of the earflap which presents as fluctuant, fluid-filled swelling on the concave surface of one or both earflaps. The objective of the present case report is to describe the surgical management of aural hematoma in a thirteen years old local breed dog that was brought to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of swollen ear flap for 6 days. Based on history and clinical examination the case was diagnosed as aural hematoma and the surgical drainage was conducted under general anesthesia. The dog was controlled in lateral recumbency with the affected ear upward. General anesthesia was achieved with a combination of Xylazine @ 1mg/kg and Ketamine @ 5 mg/kg, IM. A longitudinal incision was made over the swelling and the blood-tinged fluid was drained, all clots, fibrin deposits, and debris were cleaned and the cavity was thoroughly irrigated with povidone-iodine solution. Then a series of interrupted horizontal mattress sutures were placed parallel to the line of incision using non-absorbable monofilament suture material nylon and the pinna was dressed with povidone-iodine solution. Postoperatively, a course of antibiotics and anti-inflammatory drugs was administered for five successive days. Sutures were removed on 14th post-operative day. Finally, after two weeks of regular follow-up period the dog had an uneventful recovery.



**Keywords:** *aural hematoma, auriculocentesis, dog, surgical drainage*

## Introduction

Aural hematoma is the accumulation of blood or serum within the cartilage of the earflap which presents as fluctuant, fluid-filled swelling on the concave surface of one or both earflap (Seibert and Tobias, 2013). It is usually caused by self-inflicted trauma which is mostly reported in pendulous ear dogs like Labrador, Cookel spaniel and Basset hound but is also seen in the erect-eared breeds like German shepherd and some breed of Spits (Abdul Jalil Falih, 2010). The swelling may involve the entire ear flap or it may only involve one area. Aural hematoma is the most common physical injury of the pinna with irritation from ear mites or ticks, fly bite, otodectic mange and otitis as inciting causes (Reddy and Kumar, 2020). When something irritates the ear, the dog responds by scratching the ear or shaking its head (Pavletic, 2015).

There are several delicate blood vessels between the inner cartilage core of the ear flap and the skin. Excessive shaking or scratching can cause rupture of these blood vessels and capillaries resulting in bleeding. This causes the ear to fill up with blood tinged serosanguineous fluid in the space between the skin and cartilage and forms a "hematoma", causing the ear flap to become thickened and initially soft (Dewangan *et al.*, 2017). In the early stages of development, the hematoma can be warm to the touch, the skin may be erythematous, and the pet may experience discomfort (Hewitt and Bajwa, 2020). Hematoma should be drained as soon as possible,but if left untreated, fibrin formation can occur, leading to fibrosis, contraction and thickening, potentially leaving the ear with a deformed cauliflower- like appearance (Profile and Profile, 2018).

Hematoma can be treated medically and/ surgically (Reddy and Kumar, 2020). There are various techniques for the aural hematoma treatment. Amongthese needle aspiration method is the most conservative treatment and relieves acute pain, but recurrence is common and other includes silastic drain placement, teat cannula placement, closed suction catheter system, incisional drainage, punch biopsy and carbon dioxide laser procedure (Seibert and Tobias, 2013). The purpose of surgery is to remove the blood clot and to press the layers of the auricle together to eliminate dead space, recurrence of the hematoma and preserve phenotypic appearance of affected dogs (Abdul Jalil Falih, 2010). The present case report is aimed to describe successful surgical management of aural hematoma in a dog under general anesthesia.

***Case history and clinical examination*:** A 13 years old local breed dog was brought to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with

the history of scratching of left ear and intense head shaking since aweek and swollen ear flap since 4days.

During physical examination, there was soft fluctuating swelling on the concave side of the left ear and the ear flap was thickened (Figure 23A). Auriculocentesis with 16G fine needle reveals blood tinged serosanguineous fluid. On the basis of history and clinical examination the case was diagnosed as aural hematoma and surgical drainage was decided to be conducted under general anesthesia.

***Pre-operative preparation*:** The dog was controlled in lateral recumbency and the earflap was prepared aseptically by clipping the long hairs, shaving, washing with diluted antiseptic solution and scrubbing with povidone iodine (Figure 23B).

***Anesthesia and animal control*:** General anesthesia was achieved with a combination of xylazine @ 1.1mg/kg and ketamine @ 5mg/kg, IM and the dog was controlled in lateral recumbency with the affected ear upward. Cotton swab was placed at external auditory meatus to prevent hematoma draining into ear canal.

***Surgical procedure and technique*:** A longitudinal incision was made on the concave side of the affected earalong the length of hematoma. Then with digital compression drainage of all the accumulated blood or serum was done (Figure 23C). With gentle use of a forceps wrapped with sterile gauze all the blood clots, fibrin deposits and debris were removed (Figure 23D). Then the cavity was flushed with normal saline and povidone iodine solution. About 1-2 mm thick skin flap was removed from the edges of the incision to create a gap between the edges of skin. Finally, a series of horizontal mattress sutures were applied parallel to the incision line through entire thickness of the ear flap on both side of the incision to cover entire pinna using non absorbable monofilament suture material nylon#1 with knots on the concave surface of the ear (Figure 23E). While tying the knot a uniform pressure were maintained on the suture with help of thumb in order to make the suture sufficiently tied and the skin at this point straight with no wrinkle formation. The incised cutaneous edges were left unapposed for continued drainage. Then operated pinna was totally dressed with povidone iodine solution and the dog admitted home.


**Figure 23:** Surgical management of aural hematoma in dog

A) Swollen left ear flap up on presentation
B) Aseptic preparation of the concave side of the pinna
C) Longitudinal incision along the length of hematoma
D) Cleaning of blood clots and fibrin by sterile gauze
E) Application of multiple horizontal interrupted sutures
F) Successfully recovered and active dog after twoweeks

***Post-operative care and outcome*:** After surgery, Penstrep,1ml/10kg, IM, qd was administered for five successive days. Anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.5mg/kg, IM, qd was administered for three successive days. A single dose of Ivermectine, 0.5ml, was also administered subcutaneously. The surgical wound was dressed with antiseptics regularly for 5 days. The owner was advised to keep the dog in a clean place and apply Elizabethan collar to prevent the dog from scratching the surgical wound. The sutures were

removed after two weeks of operation. Finally, after two weeks regular follow up the dog showed uneventful recovery (Figure 23F).

**Discussion**

Aural hematomas commonly develop in a variety of canine breeds (Pavletic, 2015). Incidence of aural hematoma showed ectoparasitic infestation as a main cause followed by otitis externa (Dewangan *et al.*, 2017). In the present case management, incidence of aural hematoma was associated with excessive pawing and intense head shaking thereby causing injury to blood vessels of ear resulting into development of hematoma. Several methods have been reported in literature for management of aural haematoma (Eyarefe, Oguntoye and Emikpe, 2013). The preferred method of treatment involves surgical correction of the hematoma. The actual surgical technique varies with the individual circumstances and veterinarian's preference, but always involves the same basic steps. First, the skin over the hematoma is surgically incised to drain the blood and remove any blood clots. Next, the dead space is obliterated by placing numerous sutures through the ear, which will promote controlled scar tissue formation, reattaching the cartilage to the skin and helping prevent future recurrence (Profile and Profile, 2018). This is in complete agreement with the current surgical procedure and technique.

Complications reported in treatment of aural hematomas include recurrent hematoma formation secondary to reinjury, insufficient drainage, or incomplete healing; permanent pinnal thickening and wrinkling or deformity of the ear secondary to fibrosis and contracture; obstruction or premature displacement of drainage tubes; delayed incisional healing; and problems related to application or maintenance of bandages to protect and immobilize the affected ear while providing local access to the drainage site (Pavletic, 2015). However, in the current case complication was avoided by aseptic surgical procedure andregular postoperative care. Application of bandage is beneficial for treating aural hematoma because it protect the ear from self-trauma and keeps tissues in apposition (Seibert and Tobias, 2013). Primary, predisposing, and perpetuating factors leading to otitis and/or aural hematoma development need to be addressed to have successful resolution of the hematoma (Hewitt and Bajwa, 2020). Similarly, in the case at hand broad spectrum antibiotic and anthelminthic drugs were administered. To sum up, the findings of the present case report addressed that surgical drainage and application of horizontal mattress sutures on the ear flap is novel for the management of aural hematoma in dog.

### 3.5. Surgical Excision of Lymphoma in Cattle


## Abstract

Lymphoid tumors comprise one of the most common groups of tumors in domestic animals. The present case report is aimed to describe the surgical excision of lymphoma in a 7 years old local breed ox that was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of slowly growing solitary mass on the rump and progressively declining body condition. Up on clinical examination, the mass was painless, soft, and slightly alopecic. Exploratory aspiration with 16 gauge fine needle reveals nothing. Based on history and clinical examination the mass was diagnosed as a tumor and surgical excision was conducted under local anesthesia. After appropriate control of the animal, the surgical area was prepared for aseptic surgery, and 2% lidocaine hydrochloride was infiltrated surrounding the tumor tissue. The circular incision was made through the skin and subcutaneous tissue, and the neoplastic mass was completely excised. The skin incision was apposed by a simple interrupted suture pattern using silk #1. Postoperatively an ox was treated with antibiotics and anti-inflammatory drugs for three consecutive days. The surgical wound was dressed with antiseptics for three successive days, and finally, an ox recovers uneventfully. Gross characteristics and cytological examination confirm the neoplastic mass as lymphoma.



**Keywords:** *cytology, enzootic bovine leukosis, ox, lymphoma*


## Introduction

Nowadays, the tumor incidence in bovines is relatively increasing and cattle occupied the second place after dogs for incidence of all tumors (Sujatha K, 2018). Lymphoid tumors comprise one of the most common groups of tumors in domestic animals (Khalil *et al.,* 2020). Lymphoma in cattle is usually linked with infection by bovine leukemia virus (BLV) which causes enzootic bovine leukosis (EBL) (Mello *et al.*, 2019). Cutaneous lymphoma is a form of sporadic leukosis of cattle (SBL) that is not etiologically linked to the infection with bovine leukosis virus. Sporadic leukosis of cattle is rarely diagnosed, having an incidence of 1 in 100,000 (Kureljusic *et al.*, 2019). The cutaneous form is most common in cattle aged from one to three years (Schweizer, Hilbe and Braun, 2003).

Enzootic bovine leukosis or adult form leukosis, which is presumed attributable to BLV, presents as a B cell lymphoma and is most frequently seen in animals between three and eight years of age (Yoon *et al.*, 2005). The distribution of EBL is multicentric, since any organ can be involved, and consequently, clinical signs vary according to tumor site (Mello *et al.*, 2019). Morphologically, EBL is characterized by monoclonal proliferation of B- lymphocytes (Iwama *et al.*, 2013). There are three different disease forms on BLV infection which includes BLV infection alone without any clinical expression, increase of the absolute number of peripheral blood lymphocyte, and lymphoma, the common form in adults (Procajlo *et al.*, 2012).

About 30% of naturally infected cattle present polyclonal B-cell expansion in the peripheral blood (persistent lymphocytosis), and 1-5% of cows develop generalized B-cell lymphoma in 5-10 years following BLV infection, with a corresponding variety of clinical signs according to the organ in which lymphoma developed (Iwama *et al.*, 2013). The transmission of BLV occurs via exposing blood lymphocytes of infected animal through surgical manipulations, infected needles, and blood-sucking insects (Gür, Rdane and Yapici, 2010). The BLV infected animals carry the viral genome permanently, persistent production of antigen results with consistent antibody existence during whole life. Due to viraemi is rare or absent after specific BLV antibodies formation in blood, diagnosis of BLV is based on antibody detection (Suh *et al.*, 2005). The objective of the present case report is to highlight the surgical excision of lymphoma in 7 years old local breed ox.

***Case history and clinical examination*:** A seven years old local breed ox was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of slowly growing swelling on the rump (Figure 24A) and progressive loss of body weight since two months.

Up on clinical examination the swollen mass was soft, partially alopecic, and painless. All the vital parameters were within the normal range, but the pre-femoral lymph node was unilaterally enlarged. Aspiration of the mass reveals nothing. The mass was diagnosed as neoplastic tissue and surgical excision was determined to be conducted under local analgesia.

***Pre-operative preparation*:** After appropriate control of the animal the area surrounding the mass was aseptically prepared by washing, shaving and scrubbing with povidone iodine.

***Anesthesia and animal control*:** 2% lidocaine hydrochloride, @ 0.5mg/kg was circularly infiltrated around the tumor tissue. The animal was restrained physically in left lateral recumbency with the surgical site facing upward.

***Surgical procedure and technique*:** A circular incision was made through the skin surrounding the neoplastic mass (Figure 24B). The bleeding points were managed by ligation and crushing with haemostat forceps. The incision was advanced through subcutaneous tissue and fascia and the mass was completely excised (Figure 24C). The undermining of the skin was conducted to get sufficientskinand skin incision was apposed by simple interrupted suture pattern using silk size #2 (Figure 24D). Then the surgical area was disinfected with povidone iodine solution. Dissection of the tumor mass shows the whitish, glistening, and bulging mass with necrotic foci at the centre (Figure 24E). The excised tumor was taken to clinical pathology laboratory and giemsa staining (Annex 4) was conducted by preparing smear from the tumor mass. The result shows the proliferation of the round cell with large nucleus and scant cytoplasm which is the characteristics of lymphocytes (Figure 24F).


**Figure 24:** Surgical excision of lymphoma in 7 years old local breed ox

A) A medium size neoplastic mass on the gluteal region of an ox
B) Aseptic preparation and circular incision of the skin

C) The surgical site after complete excision of the neoplastic mass
D) Skin closure in simple interrupted pattern
E) The white, glistening, and bulging internal layer of the tumor up on dissection
F) The cytological result showing the proliferation of lymphocytes

***Post-operative care and outcome*:** After surgery an ox was administered the broad spectrum antibiotic Penstrep, 1ml/20kg, IM, qd and anti-inflammatory drug Dexamethasone sodium phosphate injection, 0.2mg/kg, IM, qd for 3 consecutive days. The surgical wound was dressed with povidone iodine for three days. Finally, the animal recovered successfully. From the gross appearance and cytological examination the neoplastic mass was confirmed as lymphoma.

**Discussion**

Enzootic bovine leukosis is a naturally occurring disease of adult cattle caused by the retrovirus, bovineleukemia virus. Bovine leukemia virus infections are prevalent in cattle populations in many countries, and the prevalence of the infection in cattle herds can reach 60 to 90%. However, only a few cattle that became infected with BLV develop lymphoma and persistent lymphocytosis, a benign proliferation of lymphoid cells (Suh *et al.*, 2005). This is in line with the case at hand in which only one animal has developed lymphoma from the herd. Enzootic bovine leukosis caused by the BLV infection is characterized by the proliferations of neoplastic lymphocytes in peripheral bloods and/or various organs. From the three different disease forms of BLV infection lymphoma is the common form in adult cattles (Yoon *et al.*, 2005).

Following BLV infection 30% of naturally infected cattle present polyclonal B-cell expansion in the peripheral blood (persistent lymphocytosis), and 1-5% of cattle develop generalized B-cell lymphoma in 5-10 years, with a corresponding variety of clinical signs according to the organ in which lymphoma developed (Iwama *et al.*, 2013). In the present case management an ox came with the clinical sign of poor body condition and cutaneous lymphoma on the rump. EBL is predominantly observed in dairy cattle, with a peak incidence between five and eight years of age (Mello *et al.*, 2019). However, in the present case lymphoma was excised from a seven years old ox. This might be due to difference in farming system; in Ethiopia oxen were used for draught purpose and kept longer on farm, but in developed countries only dairy was kept for more than five years.

The distribution of EBL is multicentric, since any organ can be involved, and consequently, clinical signs vary according to organ involved. Morphologically, EBL is characterized by monoclonal proliferation of B lymphocytes (Yoon *et al.*, 2005). Similarly, in the current case the cytological examination revealsthe proliferation of lymphocytes. In lymphoma neoplastic tissues were white to pink in color, soft and mushy in consistency, and bulged from the cut surfaces (Mathewos, 2020). In severely progressed cases, there were great varieties in the appearance of involved structure and showed black or yellow pus-like foci on the cut surfaces by haemorrhages and/or necrosis. There were also multifocal white foci caused by calcification in necrotic mass especially in the central part of large neoplastic masses (Yoon *et al.*, 2005).

This is inline with the current case in which the neoplastic mass was soft in consistency, bulges from the cut surface, whitish in color, and has necrotic foci at the centre. The cytological examination shows proliferation of lymphocytes having circular shapes and different sizes,nuclear cleavage and nucleoli, which is characteristics of B cell lymphoma. This is in agreement with the reports of the authors (Suh *et al.*, 2005) that states some cases of BLV-positive lymphoma, which were diagnosed as pleomorphic B cell lymphoma based on pleiomorphism and atypia, were cytologically distinct from other lymphoid malignancies.

The diagnosis of lymphoma could be made by cytology or histopathology, butcytological diagnosis is sometimes difficult because of the frequency of blood contamination of the aspirates (Kureljusic *et al.*, 2019). There is no treatment for viral infection or for lymphoma in cattle, but antibiotic treatment is helpful to combat secondary complications. In conclusion, the current case report agrees with the previous reports in that BLV infection lymphoma occurs in five to eight years old cattles andculling of the infected animal helps to prevent the incidence of infection within the herd.

### 3.6. Amputation of Limb in Sheep

#### Abstract

Although preservation of the entire limb is the most desirable outcome following severe musculoskeletal injury in small ruminants, the poor prognosis for return to normal function or financial considerations may necessitate partial or full limb amputation. The objective of the present case report is to describe the amputation of the distal fore limb in a two years old sheep

presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of a car accident two weeks before the admission date. During the clinical examination, the distal part (metacarpus and phalanges) of the right fore limb was fractured and the blood perfusion to the area was compromised. The limb was raised and cannot bear the weight of the animal. On the basis of history and clinical examination, amputation was conducted at the level of the carpal joint. A circular incision was made distal to the carpal joint and skin flaps were formed. Subcutaneous tissues, vessels, and ligaments were transected and the carpal joint was disarticulated. Then skin flap was sutured using non-absorbable silk #1 in a simple interrupted pattern. Post-operation antibiotics and analgesic drugs were given for 3 consecutive days. The skin suture was removed on the 14th post-operative day. Finally, after two weeks follow-up period the sheep recovers successfully and adapts to life with three limbs.

**Keywords:** *amputation, comminuted fracture, ewe, necrosis*

## Introduction

Musculoskeletal injuries of the limbs are fairly common among small ruminants evaluated in veterinary practice, because they sent to slaughter when severely injured (Kaneps, 1996). Although preservation of the entire limb is the most desirable outcome following severe musculoskeletal injury, poor prognosis for return to normal function or financial considerations may prevent this option. In such instances, partial or full limb amputation is considered a valuable alternative to euthanasia (Gamsjaeger and Chigerwe, 2018). Amputation is a commonly performed and well tolerated procedure in small animal practice for the treatment of neoplasia, peripheral neuropathies, trauma, infection, vascular compromise, and for irrevocable discomfort (Basnet and Aryal, 2019).

A potential injury requiring consideration of limb amputation in small ruminants are similar to those in cattle.Theseincludes catastrophic injuries to the limbs (i.e. open, comminuted fractures of long bones), osteomyelitis, chronic septic arthritis, and severe laceration of muscles, tendons, or nerves (Schoiswohl et al., 2020). Besides severe traumatic injuries in small ruminants from dog or wild predator bites may require limb amputation as part of treatment (Gamsjaeger and Chigerwe, 2018). Several factors are usually considered prior to limb amputation in animals. These factors include patient size, body weight, use of the animal, owner’s commitment to providing physiotherapy following limb amputation, treatment costs, presence of pathological changes in the

contralateral limb, and whether the forelimb or hind limb is affected. Thus, patient outcomes and long-term success following limb amputation can vary among species and individuals (Galindo-zamora *et al*., 2016).

Potential postsurgical complications in ruminants include breakdown of the contralateral limb, prolonged recumbency, persistent lameness, poor meat and milk production, and poor quality of life (Phillips *et al*., 2017). Small ruminants have a lower adult body weight than cattle and might be suitable candidates for limb amputation following irreparable limb injury (Schoiswohl *et al*., 2020). The objective of the current case report is to describe the successful surgical amputation of the distal fore limb in sheep.

***Case history and clinical examination*:** A two years old ewe was brought to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the historyof injury to the right fore limb from car accident two weeks before the admission date. The sheep was medically treated and the limb was immobilized with bamboo splint by local veterinarian.

During clinical examination the distal part of the right fore limb including the metacarpal bone and phalanges were severely damaged with comminuted fractures, necrotized, and the damaged limb can not bear weight (Figure 25A). Based on history and clinical examination amputation of the limb was decided to be conducted at the level of the carpal joint.

***Pre-operative preparation*:** Pre-operatively the area around the carpal joint was prepared for aseptic surgery by shaving, washing and scrubbingwith povidone iodine. The sheep was controlled in lateral recumbency and sterile drape was covered over the body by exposing the surgical area (Figure 25B). Sterile gauze was wrapped over the distal necrotized tissue to prevent cross contamination.

***Anesthesia and animal control*:** An ewe was sedated with diazepam @0.5mg/kg, IV and restrained in left lateral recumbency with affected leg upward. Local nerve blockwas conducted by circular infiltration of 2% lidocaine hydrochloride @5mg/kg, proximal to the carpal joint.

***Surgical procedure and technique*:** A tourniquet was applied proximal to the surgical area.A circular incision was made through the skin 1cm ventral to the proposed site of amputation and V-

shape skin flaps were formed on the dorsal and ventral part of the limb (Figure 25C). The underlying subcutaneous tissue was bluntly dissected; muscles and vessels were ligated and transected as needed. The collateral ligaments and other soft tissue structures were transected, the carpal joint was disarticulated (Figure 25D), andthe distal necrotized limb was removed. The tourniquet was released and bleeding was checked. Then skin flaps were sutured in simple interrupted suture pattern using non-absorbable suture material silk #1 (Figure 25E). Finally, the surgical area was disinfected with povidone iodine and the sheep was released to walk with three limbs (Figure 25F).


**Figure 25:** Amputation of distal fore limb in sheep

A) The injured non-weight bearing limb B) Preparation of the surgical area and animal control
C) Formation of skin flap D) Disarticulation of the carpal joint
E) Skin closure with simple interrupted pattern F) The proximal stump of the leg after operation

***Post-operative care and outcome*:** After surgery Penstrep, 1ml\10kg, IM, qd and analgesic Diclofenac sodium injection (75mg/3ml), 2mg/kg, IM, qd were administered for three consecutive days. The surgical area was dressed with antiseptics for three post-operative days. The skin suture

was removed on the 14th post-operative day. Finally, after two weeks regular follow up the sheep fully recovers and adapts to life with three limbs.

**Discussion**

Many long-bone fractures in small ruminants are amenable to treatment because of the animals' complacent dispositions, ability to bear weight on three limbs without complications, and relatively low body weights (Kaneps, 1996). Trauma is the most common cause of fractures, but other causes should be considered such as infection (osteomyelitis), osteoporosis, osteodystrophy (rickets), mineral deficiencies or excesses (especially calcium, phosphorous, copper, and molybdenum), and tumors (Schoiswohl *et al*., 2020). Similarly, in the current case the distal fore limb of the sheep was injured from car accident and can not bear weight.

Amputation is indicated when the prognosis for functional limb return is unfavorable, such as extensive lacerations and when reconstructive surgery is not possible (Costa *et al*., 2021). This is in line with the present case management in which the distal part of the right fore limb was fractured, necrotized, and no longer return to function.Amputation can be performed on animals of all ages and breeds. However, older animals may take a longer to adapt to life on three legs, depending on the underlying reason for the amputation (Basnet and Aryal, 2019). In the current case the sheep was 2 years old and weighs 30kg, this suggests that the sheep can adapt to life with three legs without complications.

The amputation technique must be high, so that the animal does not support the stump of the amputated limb (Gamsjaeger and Chigerwe, 2018). In the present case however, the limb was amputated at the carpal joint because the sheep will be slaughtered after the two month fasting period. The adaptation of animals to amputation is satisfactory if they remain confined to avoid possible complications such as hemorrhage, seroma, dehiscence and infection (Phillips *et al*., 2017). Veterinarians should consider the age and use of the animal when determining whether to pursue limb amputation. It is generally anticipated that young small ruminants are more likely than their older counterparts to adapt to ambulation following amputation (Gamsjaeger and Chigerwe, 2018). This agrees with the present case management in which the sheep was 2 years old and not used for breeding purpose, thus can simply adapt to ambulation with three limbs.

Perioperative administration of antimicrobials and analgesics varied by patient and was based on the reason for the limb amputation, and clinician's preference (Galindo-zamora *et al.*, 2016). In the case at hand broad spectrum antibiotics Penstrep and analgesic Diclofenac sodium was injected for three successive days post-operatively. Taken together, the current case report suggests that limb amputation is effective treatment approach in small ruminants affected with catastrophic limb injury.

### 3.7. Amputation of Tail in Calf


**Abstract**

Due to the tail's normal anatomy and physiology in farm animals, a wide variety of lethal bacterial affections can cause necrosis, gangrene, and wounds to it. The objective of the present case report is to describe the surgical amputation of the tail in a six-month-old male calf that was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of the wound at the tip of the tail since three weeks. During the clinical examination, the distal part of the tail was necrotized, the tip was sheared off, and multiple small abscesses were found on the perineal area of the calf. Based on history and clinical examination the case was diagnosed as tail necrosis and amputation was conducted under caudal epidural anesthesia. The calf was physically controlled in the standing position and epidural anesthesia was achieved by injection of 2% lidocaine hydrochloride @ 1mg/kg into the first intercoccygeal space. The skin flap was formed, the blood vessels were ligated, and the coccygeal vertebrae were transected on the proximal healthy part to prevent ascending infection. The skin flaps were covered over the caudal vertebra and sutured in a simple interrupted suture pattern using non-absorbable suture material silk #1. The surgical area was disinfected with povidone-iodine and bandaged with gauze. Postoperatively broad-spectrum antibiotic was administered for three successive days. Finally, following a one-week regular follow-up period the calf recovers successfully.



**Keywords:** *calf, epidural anesthesia, necrosis, tail amputation*

## Introduction

Farm animals like cattle use their tail as means of communication, locomotion and as an aid in their comfort, mainly to avoid the flies from biting the animal in response to skin irritation (Dasari *et al.*, 2021). On the other hand, tail is prone to various affections like dermatitis, trauma, fracture, paralysis, luxation, necrosis, gangrene, diskospondylitis, tumours, and tail rot (Nuss and Feist, 2011). Tail fractures or luxations are usually the result of trauma, such as falls, excessive traction on the tail when moving a downer cow, excessive traction on a calf during assisted delivery, and mounting heavy bulls (Dhillon *et al.*, 2006).

Due to the tail's normal anatomy and physiology, a wide variety of lethal bacterial affections can cause necrosis, gangrene and wounds to it (R. Kumar *et al.*, 2018). Inflammation and necrosis on the tail may occur in any species, but cattle and buffaloes appear to be more predisposed (Nuss and Feist, 2011). Tail gangrene is common in buffaloes and cattles, several possible causes can be identified, such as Corynebacterium bovis, deficiency of fatty acids, and microfilaria (Nuss and Feist, 2011). The infected organisms may colonize the wound which could result in local or systemic affection of the tail. If tail affections is not treated early, it may lead to the spread of disease to the spinal cord, decrease milk production and in rare cases, cause animal death (Dasari *et al.*, 2021).

Depending on the type of affection the management may vary, may be treated conservatively or by amputation cranial to the affected area. If unresponsive to medical treatment, the affections of the tail demand docking (Pratheepa, Karuppiah and Vijay, 2021). Tail docking refers to the amputation of part or all of an animal’s tail (Lakshmi *et al.*, 2016). Tail amputation in cattle is a very controversial because in some countries, it is carried out prophylactically for management reasons without any medical indication (Tucker *et al.*, 2001). A variety of methods have been used to dock tails in cattle, including cauterizing docking irons, application of elastrator bands, use of emasculators, and surgical excision.

The application of elastrator bands is the most commonly employed method (Tucker *et al.*, 2001), and docking with a hot iron is preferable as the risk of haemorrhage is reduced (Dasari *et al.*, 2021). Tetanus and gangrene have been reported after tail docking because clostridial organisms, ubiquitous in soil, may colonize the wound and result in local or systemic infection. Therefore,

vaccination against clostridia is recommended prior to performing the procedure (Dhillon *et al.*, 2006). The objective of the present case report is to describe the surgical amputation of tail in calf.

***Case history and clinical examination*:** A six month old male calf was presented to Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH with the history of wound on the tail which starts three weeks before the admission date.

Up on clinical examination the distal part of the tail was sheard off, necrotized, and multiple small abscesses are found on the perineal area of the calf (Figure 26A). All the vital parameters werewithin the normal physiological range and the calf appears apparently healthy. The necrotic tissue was ascending to the proximal healthy parts of the tail. Based on history and clinical examination the case was diagnosed as necrosis due to bacterial infection and surgical amputation was decided to be conducted under caudal epidural anesthesia.

***Pre-operative preparation*:** After the calf was controlled physically in standing positionthe surgical area was prepared for aseptic surgery by shaving, washing and scrubbing with diluted iodine solution. The distal part of the tail was wrapped with sterile gauze to prevent cross contamination.

***Anesthesia and animal control*:** Caudal epidural block was achieved by injection 2% lidocaine hydrochloride, 0.5mg/kg, into the first intercoccygeal space. The calf was restrained physically in standing position.

***Surgical procedure and technique*:** The desensitization of tail was tested by poking various parts of the tail with a needle.A tourniquet was applied at the base of the tailto temporarily reduce blood supply to the distal part. The exact point of disarticulation was determined by visualization of the extent of necrosis proximally. A ‘V’ shaped skin incision was made on the dorsal and ventral surfaces of the tail given sufficient exposure to raise two triangular flaps of skin, the bases of which corresponded to the intervertebral space through which the disarticulation is to be effected. The attachments between the skin and vertebrae wasdissected with scissors and skin flaps were elevated. The blood vessels lateral and ventral to the vertebral body were ligated cranial to the amputation site using absorbable suture material PGA size 3-0. With thumbnail and fingers, the bone was palpated to find its thickest portion. A scalpel blade was inserted perpendicular to the long axis of the tail into the dorsal joint space and the connecting ligaments

and muscle was cut. Then the vertebra mid-body wastransected and the remaining soft tissue attachments were cut (Figure 26C). The haemorrhage was checked by looseningthe tourniquet. Then the skin flap was pulled over the bone end to evaluate flap length and the excessive ventral flap was trimmed so that the dorsal flap can be pulled over the bone tip. Proper skin apposition was achieved with simple interrupted sutures using non absorbable suture material silk #2 (Figure 26B). After dressing with povidone iodine solution the bandage was applied to protect the tail end.

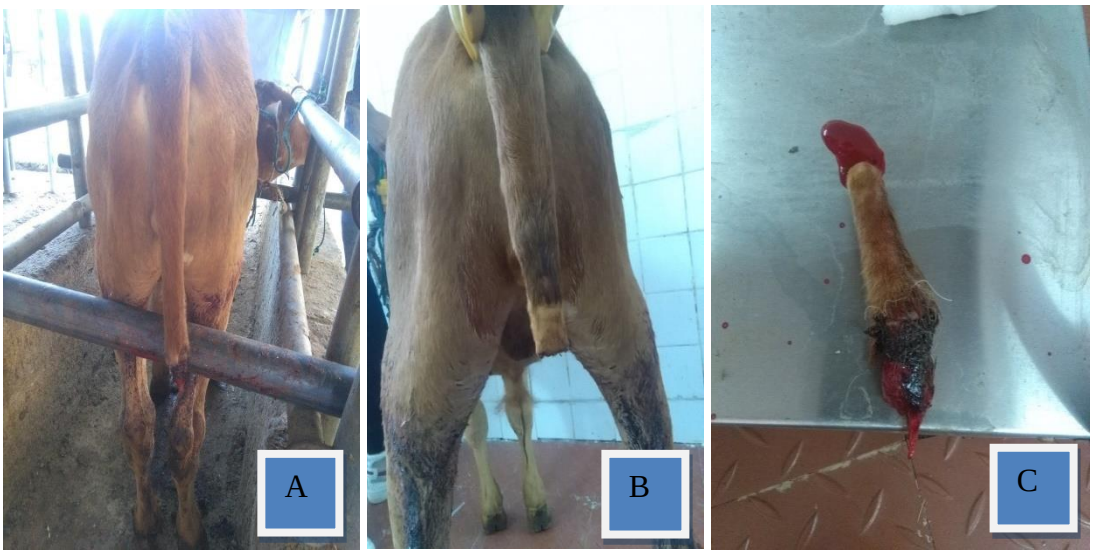



**Figure 26:** Surgical amputationof tail in calf

A) Calf with necrotized tail up on presentation
B) Appearance at the end of the surgical procedure
C) Amputated necrotized tip of the tail

***Post-operative care and outcome*:** Post-surgery Penstrep, 1ml/10kg, IM, qd was administered for three days. The surgical wound was dressed with antiseptic solution for 3 successive days. The skin suture was removed on the 14$^{th}$ post operation day. Finally, after two weeks follow up period the calf recovers successfully.

**Discussion**

Diseases of the tail like infection or necrosis of the tail tip, injury of the coccygeal vertebrae resulting in tail paralysis as well as fracture or luxation of the coccygeal vertebrae are some of the

most common disorders in cattle (Dhillon *et al.*, 2006). Congenital defects, diskospondylitis and tumours of the tail occur occasionally (Dasari *et al.*, 2021). Recurrent tail affections are a significant cause of morbidity andmortality of livestock and it is a significant challenge to manage clinically. Inflammation and necrosis on the tail may occur in any species, but cattles and buffaloes appear to be more predisposed (R. Kumar *et al.*, 2018).

A variety of factors predisposes to tail necrosis in bovines. Earlier studies reported that slatted floors play a role in the development of tail necrosis. Mouldy roughages containing Mycotoxins also cause necrosis and gangrene of the extremities, including tail tip necrosis in cattle and buffaloes (Dhillon *et al.*, 2006). Diseases of the tail may be treated conservatively or by amputation cranial to the affected area. The most immediate treatment for any animal with tail affection is to vaccinate it against tetanus (Nuss and Feist, 2011).

It has been a common practice to amputate tail affections because this might prevent the ascending infection leading to the ultimate death of the animal. Treatment with Antibiotic and anti-inflammatory agents is likely to cause relief of the pain and assist healing after the amputation of the tail (Pratheepa, Karuppiah and Vijay, 2021). Similarly in the current case broad spectrum antibiotic was administered following amputation of the tail to prevent secondary bacterial complications. The previous studies conducted by the author (Nuss and Feist, 2011) advised a cranial amputation of the affected area and the principle is that the injury towards the tail end led to dry gangrene. In conclusion, the present case report has highlighted the importance of surgical amputation of necrotized tail in cattle before the infection ascends up and cause death of the animal.

### 3.8. Surgical Management of Abscess in Cattle


**Abstract**

The abscess is an accumulation of pus surrounded by fibrous tissue that may occur anywhere in the body where pyogenic bacteria can establish and multiply. The present case report is aimed to describe the surgical management of abscesses in two cattles presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of swelling on the left ventrolateral abdominal area (case 1) and swallowing difficulty and regurgitation of ingesta through the nose (case 2). The diagnosis was made by palpation and fine-

needle aspiration. Based on history and clinical examination the cases were diagnosed as skin abscess (case 1) and deep abscess (case 2) and surgical drainage were conducted. Following appropriate restraint of the animals, the surgical site was prepared aseptically by shaving, washing, and scrubbing with povidone-iodine. The skin incision was made on the dependent area of the abscess (case 1) and the deep longitudinal incision was made over the neck (case 2) under local anesthesia. Then the abscess was evacuated in both cases, the cavity was thoroughly flushed with normal saline, the pyogenic membrane was removed by gentle rubbing with gauze-wrapped forceps, and the povidone-iodine impregnated gauze was packed into the cavities. Postoperatively broad-spectrum antibiotic and anti-inflammatory drugs were administered and the cavity was dressed with antiseptics for three consecutive days. Finally, after one week of the regular follow-up period, both animals recover uneventfully.

**Keywords:** *abscess, cattle, fine needle aspiration, surgical drainage*

## Introduction

Abscess is a circumscribed inflammatory lesion, which consists of purulent exudates. It can be formed by variable causes which may include a breach on the surface of the skin or mucous membrane and entrance of pyogenic microorganisms through it, infected foreign bodies migrating from the lumen of the digestive tract, the non-sterilized needle used for intramuscular injection, and punctured or penetrating wounds (Al-Harbi, 2011). Abscesses can develop anywhere in the body. A skin abscess is a bump that appears externally as a swollen, pus-filled lump under the surface of the skin. Internal abscesses develop inside the body, in an organ, or the spaces between organs (Williamson, 2001).

Most abscesses are caused by a bacterial infection especially, Staphylococcus species is the most common bacterial cause of skin abscesses and occurs when Staphylococcus aureus bacteria enter the body through a hair follicle or through a wound or injury that has punctured or broken the skin. When bacteria enter the body, the white blood cells attack the bacteria and some nearby tissue dies, creating a hole which then fills with pus to form an abscess. The pus contains a mixture of dead tissue, white blood cells, and bacteria. The abscess may get larger and more painful as the infection continues and more pus is produced (Hassan *et al.*, 2019). In rare cases, an abscess may be caused by a virus, fungi, or parasites (Yonas and Getachew, 2020).

The symptoms of an abscess depend on where it develops and it includes redness, tenderness, pain in the affected area, a high temperature (warmth), and swelling (if abscesses are near the skin layer) or constitutional symptoms (if abscesses are deep). The swelling may feel fluid-filled when pressed (Yonas and Getachew, 2020). Diagnosis of cutaneous and subcutaneous abscesses is by physical examination and that of deep abscesses often requires imaging/ ultrasonographic examination. A superficial abscess should be differentiated from other swellings by an exploratory puncture which reveals synovial fluid in bursitis; serous fluid in cysts; blood in hematoma; nothing or intestinal content in the hernia. In most cases, it is recommended to double-check the swelling before incising (Kobayashi, Malachowa and Deleo, 2015).

Abscesses can be treated in several different ways, depending on the type of abscess and how large it is. The main treatment options include antibiotics, a drainage procedure, and surgery.A small skin abscess may drain naturally, or simply shrink, dry up and disappear without any treatment. However, large superficial abscesses may need to be treated with antibiotics to clear the infection, and the pus may need to be drained through an incision (Sahoo, S. and Ganguly, 2016). The aim of the present case report is to describe the surgical drainage of abscess in two cattles.

**Case history and clinical examination**

**Case 1:** A four years old local breed cow weighing ~200kg was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of gradually increasing swelling on the left ventrolateral abdomen since a month.

Up on clinical examination there was cold and large swelling having soft consistency on the ventrolateral abdomen (Figure 27A). Aspiration of the content using a18-gauge sterile needle reveals creamy pus. All vital parameters were within the normal range.

**Case 2:** A three years old cross breed bull weighing ~200kg was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of swallowing difficulty and regurgitation through mouth and nostrils since a week. The bull managed intensively and feed on straw and wheat bran. and the bull was depressed and dehydrated (Figure 28A).

Stomach tube was inserted through the mouth but couldn't pass through the oesophagus and it's painful for the animal. Up on external palpation there was a soft, fluctuating mass caudal to the pharynx. Fine needle aspiration using 16gauge 1.5 inch needle reveals thick, yellowish creamy pus. Based on history and clinical findings the case was diagnosed as superficial (case 1) and deep(case 2) abscess and surgical drainage was decided to be conducted under local anesthesia.

***Pre-operative preparation*:** After appropriate restraining of the animals the surgical area was aseptically prepared by shaving, washing with water and savlon and scrubbing with povidone iodine (Figures 27B and 28B).

***Anesthesia and animal control*:** Local anesthesia was achieved by infiltration of 2% lidocaine hydrochloride @ 0.5mg/kg into the surgical areain (case 2) (Figure 27C). The animals were controlled physically in right lateral recumbency.

***Surgical procedure and technique*:** After preparation of the surgical area an incision was made on the dependent area of the abscess in superficial skin abscess (case 1) (Figure 27B). However, the abscess was deep (case 2) and a longitudinal skin incision was made with scalpel blade (Figure 28D), the incision was advanced with blunt dissection of subcutaneous tissue and muscles were retracted with hand held retractor (Figure 28E). Fine needle aspiration was made to take sample for bacteriological examination (case 2) (Figure 28F). The cavity were opened and large volumeof cold creamy pus in (case 1) (Figure 27C) and hot, thick, and creamy pus was drained in (case 2) (Figure 28G). The cavity was thoroughly washed with normal saline solution (Figures 27D & 28H). Then the cavity was rubbed with sterile gauze wrapped forceps to remove the pyogenic membrane. Finally, the cavity was packed with povidone iodine impregnated gauze with a set on protruding out of the incision to allow pus drainage (Figures 27E & 28H).


**Figure 27:** Surgical drainage of superficial skin abscess in local breed cow

A) The left ventrolateral abdominal swelling up on presentation
B) Preparation of the surgical area and animal control in lateral recumbency
C) Skin incision on the dependent area and abscess drainage
D) Flushing of the cavity with normal saline solution
E) Packing of the cavity with povidone iodine soaked gauze


**Figure 28:** Surgical drainage of deep abscess in cross breed bull

A) Dull, depressed and dehydrated bull up on presentation
B) Animal control and aseptic preparation of the surgical area
C) Infiltration of lidocaine hydrochloride at the surgical area
D) Longitudinal skin incision over the abscess area
E) Separation of subcutaneous tissue by blunt dissection
F) Retraction of the muscles and skin to the side and exploratory aspiration
G) Drainage of large volume, hot, thick creamy abscess from the cavity
H) The surgical site after packing with iodine soaked gauze
I) The result of bacteriological examination by gram staining

***Post-operative care and outcome*:** After surgery broad spectrum antibiotic Penstrep,1ml/20kg, IM, qd was administered for five consecutive days in both cases. Anti-inflammatory drug Dexamethasone sodium injection, 0.1mg/kg, IM, qd was administered for three successive days in (case 2) because inflammation may obstruct the oesophagus. The abscess cavity was regularly dressed with antiseptics for three days in both cases. Both animals were successfully recovered without recurrence after one week regular follow up period. The abscess sample from case 2 was taken to multipurpose laboratory for bacteriological examination and gram staining shows the presence of gram negative bacteria (Figure 28I).

**Discussion**

Abscess is the collections of pus in confined tissue spaces, usually caused by bacterial infection and the most common is Staphylococcus aureus bacteria (Kobayashi, Malachowa and Deleo, 2015). Proper drainage of pus from the abscess area is important as antimicrobial drugs are usually ineffective without drainage (Hassan *et al.*, 2019). Similarly, in the present case managementthe pus was drained and broad spectrum antibiotic was administered for five successive post-operative days. Abscesses may begin in an area of injury or in compromised tissue where leukocytes accumulate, but progressive dissection by pus or necrosis of surrounding cells expands the abscess (Yonas and Getachew, 2020).

In the cases at hand the injury was from horn thrust in case 1 and the pus was accumulated around the injury area however, the abscess was found along side the oesophagus in case 2 besides the cause of abscess formation is supposed to be injury from coarse roughage feed. The symptoms and signs of superficial skin abscesses includes pain, heat, swelling, tenderness, and redness and similarly for deep abscesses, local pain, tenderness and systemic symptoms, especially fever, anorexia and weight loss, are common findings (Hassan *et al.*, 2019). Those sign and symptoms are also reported in the current case management. Definitive diagnosis is made by aspiration of the contents of the swelling. Thisis in agreement with the reports of the authors (Sahoo, S. and Ganguly, 2016) that states the exploratory puncture was highly diagnostic in case of abscesses. Besides, size, consistency, nature, and color of the contents play a considerable role in the diagnosis and differential diagnosis of abscesses. The surgical procedure implemented in the current case management was in line with the proceduredescribed by the authors (Yonas and Getachew, 2020; Hassan *et al.*, 2019).

Personal hygiene precautions is necessary when dealing with abscesses as bacteria that may be present can infect humans and they may be resistant to antibiotics (Sahoo, S. and Ganguly, 2016). A similar precaution was followed during the current surgical procedure. Coarse, prickly and grass seed-containing feeds should be avoided if lymph node abscesses of the head and neck are a problem (Misk and Sadan, 2015). Similarly in the present case management of (case 2) the owner was advised not to provide the animal the coarse feed and supplement the bull to enhance the immunity of the animal. In conclusion,the evidence from the present case report suggests that surgical drainage along with antibiotic treatment is the effective management method of abscess in cattles.

### 3.9. Tipping of Ingrown Horn in Bull


**Abstract**

An ingrown horn is a horn that breaks the skin surface of the face of an animal. In serious cases, it may continue to grow and penetrate the sensitive areas of facial tissue. The present case report is aimed to describe the tipping of ingrown horn in a five years old local breed bull weighing ~ 200kg that was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with a history of restlessness, aggressiveness, and reduced appetite since two weeks. During clinical examination, both horns grow misdirected and penetrate the sensitive tissues of the face. Based on history and clinical examination, the case was diagnosed as pressure injury from an ingrown horn and horn tipping was conducted to cut the sharp ends of the horn. The bull was sedated with 2% xylazine hydrochloride and controlled in lateral recumbency. Then the non-sensitive tip of the horns was marked and amputated using obstetrical wire. Broad-spectrum antibiotic Penstrep @ 1ml/20kg and analgesic tramadol @ 2mg/kg were administered for three successive days post-operation. Penetrated wound on the face was regularly dressed with antiseptics for three days. Finally, the bull was recovered completely after one week of regular follow-up.



**Keywords:** *bull, horn tipping, ingrown horn, obstetrical wire*

## Introduction

Horns are special adaptations of the integument which are produced from the area of cells located at the junction of the horn and skin known as corium (Hoffsis, 1995). Horns begin as buds within the skin of the poll. At approximately 2 months of age, the horn buds become attached to the periosteum of the frontal bone overlying the frontal sinus (Tutor *et al.,* 2018). As the horns grow, the cornual diverticulum of the caudal portion of the frontal sinus extends into the most proximal portion of the horn. If the horn but not the corium is removed, horns will resume growing (Manteca, Mainau and Temple, 2012). The cornual nerve, a branch of the Trigeminal nerve (cranial nerve V), provides sensation to the skin of the horn/horn bud region. Injection of a local anesthetic around the cornual nerve as it traverses the frontal crest desensitizes the area (Hoffsis, 1995).

An ingrown horn is a horn that breaks the skin surface of the face of an animal. In serious cases, it may continue to grow and penetrate the sensitive areas of facial tissue. If a horn penetrates the skin, the animal is likely to suffer pain from the pressure on and destruction of sensitive nerves in the face (Manteca, Mainau and Temple, 2012). Ingrown horns should be tipped and the resulting wound needs to be cleaned with antiseptic. Deep wounds may need to be examined and treated to ensure the wounds heal adequately (American Veterinary Medical Association, 2014).

Horn tipping is the removal of the insensitive part of the horn of an adult animal resulting in a blunt horn end (Stevenson, 1994). It should be carried out when the horn is growing in a direction that is likely to penetrate the skin, when touching the skin of the animal, and blocks the ability for an animal to see clearly from one eye (Prasad *et al.*, 2016). The presentcase report is aimed to describe the tipping of ingrown horn thatpenetrates the sensitive areas of the face in bull.

***Case history and clinical examination*:** A five years old local breed bull weighing ~200kg was presented to Addis Ababa University College of Veterinary Medicine and Agriculture, Feseha Gebre Ab VTH with the history of restlessness, aggressiveness, and reduced appetite since three weeks. The bull was bought from the market one month before the admission date.

Up on clinical examination both horns were misdirected toward the face of the bull and penetrates the facial tissue (Figure 29A). The bull has good body condition and all the vital parameters are within the normal range. Based on history and clinical examination the case was diagnosed

ascontinuous pressure injury from ingrown horn and horn tipping was determined to be conducted by sedating the bull.

***Pre-operative preparation*:** The bull was restrained on the ground in lateral recumbent position. The non-sensitive tips of the horns were marked for cutting. The embryotomy wire was sterilized in the autoclave.

***Anesthesia and animal control*:** The bull was sedated with 2% xylazine hydrochloride @ 1mg/kg, IM and controlled in lateral recumbency.

***Surgical procedure and technique*:** The embryotomy wire was held on the previously marked point of the right horn sheath. Then tipping was conducted by alternately pulling the two handles rapidly (figure 29B). The same procedure was followed for the opposite horn. The longer part of left horn was amputated because it penetrates deep into the facial tissues (Figure 29C).

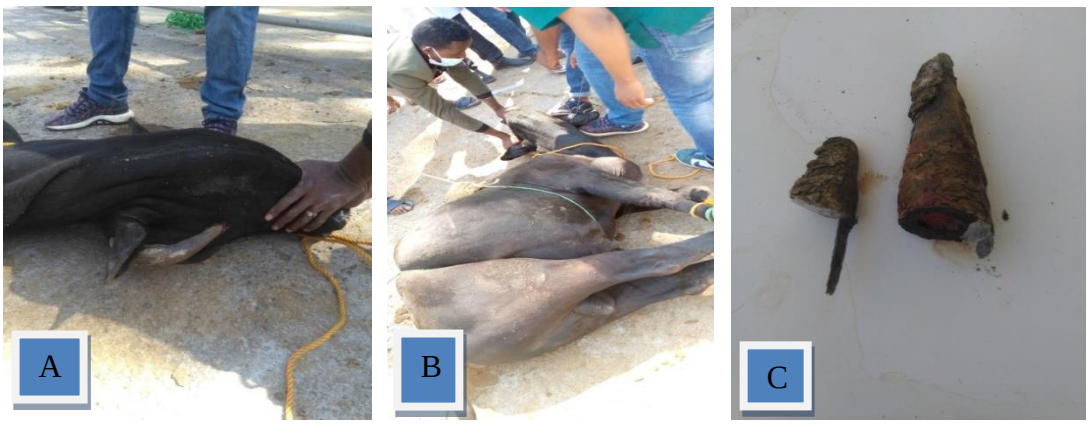



**Figure 29:** Amputation of the ingrown horn in bull

A) Ingrown horn penetrating the facial tissues up on presentation
B) Tipping procedure using obstetrical wire
C) Tipped horns from both sides

***Post-operative care and outcome*:** Broad spectrum antibiotic Penstrep, 1ml/20kg, IM, qd and analgesic tramadol 5mg/kg, IM, qd was administered for three successive days. The penetrated facial wound was regularly dressed with antiseptics for three days. Finally, after one week regular follow up the bull recovered successfully.

**Discussion**

A horn that grows in a wrong direction and breaks the skin surface of the face of an animal, known as an ingrown horn, may continue to grow and penetrate the sensitive areas of facial tissue (Tutor *et al.*, 2018). This is in complete agreement with the present case management in which ingrown horn in bull causes pressure injury to the sensitive tissues of the face. When cattle have large horns they are sometimes “tipped”, a procedure that removes the sharp end of the horn but leaves the base (Tutor *et al.*, 2018). Horn tipping in livestock is recommended as overgrown horns can penetrate the sensitive areas of the face (Prasad *et al.*, 2016).

In addition horn tipping in cattlecan reduce injury to both livestock handlers and animals caused by aggressive horned animals. Horn tipping is always carried out under three circumstances; when the horn is growing in a direction that is likely to penetrate the skin, when the horn is touching the skin of the animal, and when the horn is blocking the ability for an animal to see clearly from one eye (Stock *et al.*, 2013). Similarly in the current case management the right horn is growing in a direction that is likely to penetrate the skin whereas the left horn deeply penetrates the sensitive tissues of the face.

The post-operative management of dehorning is very important in preventing bacterial contamination of the wound (Fordyce, McMillan and McGrath, 2018). Pre or post use of non-steroidal analgesics has proven effective in reducing pain and swelling in the dehorned site (Vickers *et al.*, 2005). In the current case management tramadol and Penstrep were administered post operatively to reduce pain and prevent bacterial complication respectively. The injured site on the face of the bull was dressed with antiseptics to prevent infection. In conclusion, the present case report highlighted that misdirected/ingrown horn in cattle can be managed successfully by surgical tipping followed by antibiotic and antipain treatment.

### 3.10. Hyena Bite Wound Management in Donkey

**Abstract**

Despite their irreplaceable contributions, equines in Ethiopia, particularly donkeys, are the most neglected animals, given low social status, and health and welfare are visible problems. The present case report is aimed to highlight the management of avulsion wound in a four years old

jenny weighing ~150kg that was presented to the Addis Ababa University College of Veterinary Medicine and Agriculture Donkey sanctuary clinic with the history of Hyena bite twelve hours before admission. Up on clinical examination large area of the right thigh muscle was avulsed and the wound was contaminated with debris. On the basis of history and clinical examination, the case was diagnosed as an avulsion, contaminated wound, and open wound management was conducted under epidural anesthesia. The caudal epidural block was achieved by injection of 2% lidocaine hydrochloride. The hair surrounding the wound area was liberally shaved, viable skin was sutured, loosely attached and hypoxic tissues were trimmed off, and the wound was thoroughly irrigated with normal saline to remove all dirt. Then zinc oxide ointment was applied to the periphery of the wound to maintain the elasticity of the skin. Since a large area of tissue was lost and the wound was contaminated, the wound was left open to heal by second intention wound healing. Postoperatively broad-spectrum antibiotic was administered for three days and the wound was regularly dressed with antiseptics for three successive days. Finally, the jenny was recovered after two weeks regular follow-up period.

**Keywords:** *avulsion wound, hyena bite, jenny, second intention wound healing*

## Introduction

In developing countries like Ethiopia where there is less developed transport and communication services and road network insufficiently developed, the natural choice rests on the use of human labor and pack animal as a mode of transport. The under-developed road transport network and the rough terrain of the country make the donkey the most valuable and affordable pack animal under small holder farming system of Ethiopia (Gebreabl *et al.*, 2003). Ethiopia has about 7.9 million equines, of which 5.2 million are donkeys. This figure suggests that the country has the highest donkey population in the world next to the china (Ababa and Bj, 2016).

Despite their invaluable contributions, equines in Ethiopia, particularly donkeys, are the most neglected animals and given low social status; health and welfare is a visible problem.Even though donkeys have often been described as sturdy animals, they succumb to a variety of diseases and a number of other problems like traumatic wound (Garoma, 2018). A various degrees of wound on donkeysarise from over loading, inappropriate harness, hobbles and saddle design, hyena bite, donkey bite and car accident, injury by the owners or other people and horn thrust from horned zebus (Ababa and Bj, 2016).

A wound is a breakdown in the protective function of the skin or loss of continuity of epithelium, with or without loss of underlying connective tissues, muscles, nerves, and bones (Fsahaye *et al.*, 2018). Wound in working donkeys includes tissue damage with or without hemorrhage, abscess formation, or any secondary bacterial complication. The incidence of traumatic wounds in equine is high, usually become chronic, and difficult to manage (Jørgensen, Bjarnsholt and Jacobsen, 2021).

In addition to mechanical injuries due to inanimate objects, car accidents, and kicks, hyena bites are also common traumatic wounds resulting from minor laceration to deep avulsion in donkeys especially in developing countries where management is poor (Tesfaye and Curran, 2005). Bite wound is characterized by irregular edges with underlying tissues removed as well as hemorrhage (Brennan, 2017). Treatment methods that are employed in the management of wounds focus on rapid and efficient evaluation, conscientious, aseptic surgical techniques, and thorough and prolonged post-operative care (Pritchard *et al.*, 2005). The aim of the present case report is to addressthe management of avulsion wound in donkey.

***Case history and clinical examination*:** A six years old jenny weighing ~150kg was presented to Addis Ababa University, College of Veterinary Medicine and Agriculture, Donkey sanctuary clinic with the history of hyena bite twelve hours before admission.

During clinical examination the perineal area was severely injured with the deep avulsion wound. The thigh muscle of the right hind limb, vulva and few parts of the udder was affected. Nerve wasnot affected and the jenny can walk. The wound has irregular edges and loosely attached skin and muscle were hanging with some bleeding points (Figure 30A). The body weight of the donkey was estimated to 150kg. On the basis of history and clinical examination the case was diagnosed as contaminated avulsion wound and open wound management was determined to be conducted under epidural anesthesia.

***Pre-operative preparation*:** After appropriate control of the jenny the periphery of the wound was shaved to reduce contamination and tissue irritation.

***Anesthesia and animal control*:** Epidural anesthesia was achieved by injection of 2% lidocaine hydrochloride, @ 0.5mg/kg into the sacrococcygeal space. The jenny was physically restrained by raising one front limb with the help of the owner.

***Surgical procedure and technique*:** After shaving the hair surrounding the wound area, the wound was thoroughly washed with savlon and water, irrigated with normal saline to remove all dirt. Viable skin was replaced and sutured to their normal position. But loosely attached and hypoxic muscle and skin was trimmed off by clamping with hemostatic forceps proximally. Zinc oxide ointment was applied at the wound periphery to maintain elasticity of the skin and enhance the healing process (Figure 30B). Since large area of skin and tissue was lost, the wound was too wide to close, and left opento heal by second intention wound healing. Finally, the jenny was admitted home.


**Figure 30:** Management of avulsion wound in donkey

A) Avulsion wound up on presentation
B) The wound area at the end of the surgical correction

***Post-operative care and outcome*:** The broad spectrum antibiotic Penstrep, 1ml/20kg, IM, qd was administered for three consecutive days. The wound was regularly debrided, lavaged and dressed with antiseptics for three days. The owner was advised to maintain the cleanliness of the wound until it heals and provide the donkey a supplementary feed. Finally, the jenny was recovered successfully after three weeks regular follow up period.

**Discussion**

Wounds are one of the primary welfare concerns of working equids (Eggleston, 2018).The most common cause of wounds in working equine includesover loading, accidents, improper position of load predisposing to falling, hyena bites, donkey bites, injuries inflicted by horned Zebu. Some hobbling methods, inappropriate harnesses or yokes that may be heavy and ragged, long working hours may cause discomfort and also inflict wounds (Brennan, 2017). This is inline with the current case managementin which the jennywas severely injured from hyena bite.

Similarly, the study conducted by the author (Tesfaye and Curran, 2005) reported the high incidence of hyena bite in working donkeys in the current study area. Hyenas seem to consume domestic prey species in this locality suggesting the virtual absence of wild prey species. Hyena bite may cause loss of tissues and or even death of the donkeys depending on the severity of the wound. However, the survived donkey from hyena bite experience extremely painful, stressful and indeed the most critical welfare issue (Curran, Feseha and Smith, 2005). The case at hand dealt with contaminated traumatic wound having the age of twelve hours and necrotic debris on the perineal area in which the donkey survived.

The primary goal in the management of wounds is to achieve rapid healing with optimal functional and aesthetic results. This is best accomplished by preventing infection and further trauma and by providing an environment that optimizes healing of the wound (Olaifa, 2017). Necrotic tissue and bacterial infection are major roadblocks to effective and cosmetic wound healing (Singh, Young and McNaught, 2017). Wounds that contain necrotic and ischemic tissue take longer to close and heal,asnecrotic tissue provides an ideal growth medium for bacteria (Eggleston, 2018). Similarly, in the present open wound management the wound was thoroughly washed and debrided to remove debris and minimize bacterial load then broad spectrum antibiotic was administered to prevent infection that might delay wound healing. To sum up, the present case management was consistent with the previous findings in that hyena bite wounds in equines were managed as an open wound and successful results obtained.

## 4. SUMMARY OF THE COMPILED SURGICAL CASE REPORTS

In this study, the surgical operation was performed on a total of 29 domestic animals with different surgical ailments at Addis Ababa University College of Veterinary Medicine and Agriculture Feseha Gebre Ab VTH, SPANA, Donkey sanctuary clinic and on-farm in and around Bishoftu town. Different domestic animal species which includes 48.3% (14/29) bovine, 24.1% (7/29) canine, 10.3% (3/29) ovine, 6.9% (2/29) feline, 6.9% (2/29) equine, and 3.4% (1/29) camel were surgically managed. During the study period, 93.10% (27/29) of patients were successfully recovered after surgical treatment, whereas 6.9% (2/29) of animals (sheep and dog) died from shock and anorexia respectively as described in Table 2 below.

**Table 2:** Species of animals presented for surgical cases and treatment outcomes

| **Species of animals** | **Number** | **Sex** | | **Percentage** | **Treatment outcomes** | |
|---|---|---|---|---|---|---|
| | | male | female | | Recovered | Died |
| **Bovine** | 14 | 9 | 5 | 48.27% | 14 | 0 |
| **Ovine** | 3 | 0 | 3 | 10.34% | 2 | 1 |
| **Canine** | 7 | 4 | 3 | 24.13% | 6 | 1 |
| **Feline** | 2 | 0 | 2 | 6.89% | 2 | 0 |
| **Equine** | 2 | 1 | 1 | 6.89% | 2 | 0 |
| **Camel** | 1 | 1 | 0 | 3.44% | 1 | 0 |
| **Total** | 29 | 15 | 14 | 100% | 27 | 2 |

Surgical sterilization of male and female animals 17.24% (5/29), cesarean section 13.8% (4/29), and penile amputation 10.3% (3/29) were the most commonly performed surgical operations. Hernial repair, rumenotomy, and abscess management were conducted each on 6.9% (2/29) of animals. The surgical removal of cystic calculi, drainage of aural hematoma, tumor excision, hyena bite wound management, limb, horn, and tail amputation, and eye extirpation were conducted each on 3.4% (1/29) of animals. Post-operative complications were recorded in 33.33% (9/27) of the recovered patients. This includes seroma and abscess formation in 18.51% (5/27), swelling of the surgical site in 7.4% (2/27), surgical site herniation in 3.7% (1/27), and wound dehiscence in 3.7% (1/27) of animals. Surgical management performed and post-operative complications are summarized in Table 3 below.

**Table 3:** Types of surgical operations performed and post-operative complications

| Species of animal | Surgical managements | Percentage | Post-operative complications |
|---|---|---|---|
| **Bovine** | Abdominal hernia repair | 1 (7.14%) | Seroma |
| | Vaginal prolapse repair | 1 (7.14%) | - |
| | Uterine prolapse repair | 1 (7.14%) | - |
| | Rumenotomy | 1 (7.14%) | Abscess |
| | C - section | 1 (7.14%) | - |
| | Penile amputation | 3 (21.42%) | - |
| | Skin tumor excision | 1 (7.14%) | - |
| | Abscess drainage | 2 (14.28%) | - |
| | Eye extirpation | 1 (7.14%) | seroma |
| | Horn amputation | 1 (7.14%) | - |
| | Tail amputation | 1 (7.14%) | - |
| **Canine** | Open castration | 2 (28.57%) | Swelling of the surgical site |
| | Spaying | 2 (28.57%) | - |
| | Removal of cystic calculi | 1 (14.28%) | Death |
| | Aural hematoma drainage | 1 (14.28%) | - |
| | C - section | 1 (14.28%) | Seroma |
| **Ovine** | Rumenotomy | 1 (33.33%) | Surgical site herniation |
| | Limb amputation | 1 (33.33%) | - |
| | Rumenevisceration repair | 1 (33.33%) | Death |
| **Feline** | C - section | 2 (100%) | Wound dehiscence |
| **Equine** | Abdominal hernia repair in stallion | 1 (50%) | Abscess |
| | Hyena bite in donkey | 1 (50%) | - |
| **Camel** | Open castration | 1 (100%) | - |

## 5. CONCLUSION AND RECOMMENDATIONS

Livestock can be affected by different surgical ailments which result in culling, and eventual loss of a productive and valuable animal through death, but can be managed by surgical treatment and correction. In this study, a total of 29 different animal species with various ailments were surgically treated at different veterinary clinical centers namely: VTH, Donkey Sanctuary Clinic, SPANA, and on-farm in and around Bishoftu town. During the study, different surgical procedures were aseptically performed, post-operative care provided, and the surgical patients were regularly followed for any post-operative complicationsand to assess their outcome. Among these surgical sterilization of both male and female animals, cesarean section, and penile amputation were the most commonly performed. During surgical handling, almost all animals that underwent surgical corrections and repair were successfully recovered except for one sheep and dog that died due to shock and anorexia respectively. In conclusion, successful surgical management requiresan efficient surgical skills and experience, an effective diagnosis and pre-operative management, sound surgical judgment and technique, and intensive post-operative care. However, several factors like the delayed presentation of the case, lack of diagnostic tools and ambulatory service, inaccessibility of general anesthetics, shortage of intensive care units for severely affected animals, and lack of awareness and negligence among the owners of surgical patients were the major constraints during the study period.

Therefore, based on the above conclusion the following recommendations were forwarded:

- Surgical operations should be performed under strict principles of surgical asepsis by qualified veterinary surgeons
- Further surgical case reports should be documented so that it could be used as a reference for students, clinicians and researchers
- The Owners should be made aware of the health of their animal through livestock extension education
- The VTH should have to equipped with sufficient surgical kits, diagnostic tools, and anesthetic agents

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## 7. LIST OF ANNEXES

**Annex 1:** Clinical parameters of some species of domestic animals

| Species | Temprature($^{o}$C) | HH (beats/min) | RR (breaths/min) | CRT |
|---|---|---|---|---|
| **Cattle** | 37.5-38.5 | 60-70 | 30 | < 2 sec |
| **Sheep** | 38.3-39.9 | 70-80 | 16-34 | < 2 sec |
| **Dog** | 37.9-39.9 | 70-120 | 18-34 | < 2 sec |
| **Cat** | 38.1-39.2 | 120-140 | 20-30 | < 2 sec |
| **Horse** | 37.2-38.2 | 28-40 | 10-14 | < 2 sec |
| **Donkey** | 36.7-38.3 | 28-40 | 8-16 | < 2 sec |
| **Camel** | 37.8-39.7 | 40-50 | 8-14 | < 2 sec |

**(Source:** Adapted from Fielder Susan E. Reference guides in: MSD veterinary manual. Merck &Co., Inc., 2016)

**Annex 2: Case Recording Format**

Date._____

Case No._____

**Name of the clinic center:** VTHI☐nkey sanctuary☐ SPANA ☐OTHER☐

**Animal Detail**

**Species:** Bovine☐ Ovine ☐ Feline☐ Canine☐Camel☐Equine☐

**Breed** _____ Sex: Male☐ Female ☐**Age**: _____

**Animal identification** _____ Name /if any/ _____

**OWNER DETAIL**

Owners' Name _____Address: Town _____Kebele _____ Occupation_____ Phone No _____

**CASE HISTORY**

_____

_____

**CLINICAL FINDING**

Body Temp ____$^{o}$C, Respiration rate ____Breaths/min, Heart rate _____ Beats/min

Ruminal Motility ____/min, Gut sound _____ VMM: Normal, pale, Congested,Jaundice, Cyanotic CRT:_____, Body Condition score:_____, Superficial Ln: PF___ PS___MND _____RPH_____ OTHER_____

**Description of the Case:**_____

_____

**Organ or system affected:** Nervous, Musculoskeletal, Respiratory,Circulatory, Digestive, Urogenital,Integumentary, Other (specify)

**SAMPLE TAKEN**

Faeces, Blood, skin scraping,nasal swab, vaginal swab, Ruminal content, Urine

Differential Diagnosis List:_____

Laboratory Result:_____

Tentative Diagnosis: _____

Definitive Diagnosis:_____

Prognosis: _____

**PATIENT CARD**

**Observation and treatment**

Clinical work to be performed: Surgical- **specific surgical operation** Medical_____Gynaecology/Obstetric_____Followup/Quarantine_____

**MEDICAL TREATMENT ADMINISTERED**

_____

_____

Date: _____

Name of Staff in Charge: _____Signature_____

Student in Charge: _____Signature_____

**Annex 3: Owner's consent format**

Owner's name: _____ Telephone: _____

Animal species: _____ Animal name:_____ Sex: _____ Age:_____

I, the owner of the above mentioned animal, am informed on the terms of the procedure and consented for the surgery (name of procedure) to be performed on my animal.

Signature: _____ Date: _____

**Annex 4:** Preparation of Giemsa working solution and staining procedure

Preparation of working solution

Giemsa powder……1gm

Glycerol……46gm

Mix thoroughly and heat to $50^{o}$C for $1^{1/2}$ hours.

Add methanol…….66ml

Mix and leave to stand for 7 days

Mix and store in glass stopper

**Smear preparation**

1. The tumor mass was transported in 10% buffered formalin
2. The mass was dissected and smear was prepared on multiple clean glass slide by FNA, squash and imprint techniques

**Staining procedure**

1. Make smear & allow air drying thoroughly.
2. Fix the slide with Methanol for 2 minutes.
3. Stain with 10% Giemsa solution for 30 minutes.
4. Wash the slide with distilled water until the smear become pink.
5. Allow to dry in air or using filter paper.
6. Examine the dried slide under oil immersion objective.

**Source:** (Welfare, 2005)

**Annex 5:** Procedure of Grams staining and interpretation

**Step 1.** Prepare the smear and heat fix by passing the slide over the Bunsen burner flame
**Step 2.** Stain with crystal violet for 3 minutes
**Step 3.** Rinse with tap water and drain
**Step 4.** Flood the slide with iodine and allow to stay for 20 to 60 seconds
**Step 5.** Rinse with tap water and drain
**Step 6.** Decolorize with 95% ethanol until the blue dye no longer run off
**Step 7.** Rinse with tap water and drain
**Step 8.** Counter stain with carbol fuchsin or safranin for 60 seconds
**Step 9.** Rinse with tap water and blot dry
**Step 10.** Examine under microscope using oil immersion (40x/100x)

**Interpretation:**

Grams positive bacteria will show purple color

Grams negative bacteria will show red/pink